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A Comparison of the Aptitude and Attitude of College Students Toward Social and Technical Computer Technology

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A COMPARISON OF THE APTITUDE AND ATTITUDE OF COLLEGE STUDENTS TOWARD SOCIAL AND TECHNICAL COMPUTER TECHNOLOGY

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ABSTRACT

The purpose of this study was to investigate college students' technical and social technology competencies based upon their attitudes toward computers and their perception of technical computer knowledge. The participants for this investigation were college undergraduates majoring in apparel merchandising and design and other related and non-related majors at the University of Arkansas. The research model selected for use in this study was the survey design method. There were a total of 1270 students responding to the survey with 1052 usable surveys remaining after cleaning the data for missing entries. This constituted an 83% response rate.

The findings included significant effects of social aptitude by age and major, and technical aptitude by major. Males had significantly higher perceptions of technical aptitude, and both social and technical attitude toward computer technology than females. Whites had significantly higher perceptions of social aptitude toward computer technology than Nonwhites. Class standing had no significant effect on college student's perceptions of either aptitude or attitude in social or technical computer technology. There were strong correlations between social aptitude and technical aptitude and social attitude and technical attitude.

Colleges and universities as well as industry are taking advantage of social technology not only for recruitment but in the classroom and on the job as well. A strong relationship between social and technical aptitude and social and technical attitude would tend to indicate that students are ready for this type of interaction

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DEDICATION

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CHAPTER I

Introduction

Context of the Problem

The move toward computerization continues to be a trend in many vocations, including the apparel industry. For students graduating from post-secondary institutions, it is essential to have skills in microcomputer applications in their chosen field (Larson & Smith, 1994). Most careers in the fashion industry today involve the use of computer technologies (Dickerson, 2003). As the apparel industry continues to change, individuals must learn new skills, including computer skills, to adapt to the changes in this business. Computer literacy of college undergraduates has become a growing concern among higher education institution leaders, as well as employers (McAulay, 1993). Studies have shown that there are an increasing number of jobs that require the use of computers (Fraser & Goldstein, 1985; McAulay, 1993). College graduates with computer technology experience continue to be in high demand by industry professionals (Dickerson, 2003).

There have been definite improvements in the skill and knowledge base of students graduating with computer-aided-design and computer-aided-manufacturing (CAD/CAM) experience (Devane, 1992). According to a study by Lee-Kang (1994), the use of CAD software is increasing among undergraduate apparel programs with specific industrial computer software being implemented into many apparel programs in higher education curricula. In addition to specialized industry software, knowledge and proficiency of office-based software including word processing, spreadsheets and databases is required of apparel students both in the classroom and on the job. The

software market has been flooded with Windows-based application programs resulting in an increased need to select employees with high levels of Windows-based computer expertise (Miller, Stanney, & Wooten, 1997). Effective computer usage of both office-based software, as well as industry based software has the potential to contribute to improved performance both in the classroom and in the workplace (Levine & Donitsa-Schmidt, 1997). Graduates with competencies in both types of computer technologies tend to make a smoother transition into a professional career (Dickerson, 2003).

Textile and apparel industries and higher education must make informed decisions regarding the direction and scope of the technology needed in the future. This specifically includes the implementation of industry based technology as well as office based computer software systems in the higher education curriculum. Studies have shown that undergraduates are aware of the increasing use of computers in the job market and recognize the need to become computer literate (McAulay, 1993). It has been widely assumed that undergraduates today have technological savvy well beyond that of their predecessors (Howe & Strauss, 2000). However, with the emphasis being placed on specialized industry software as well as office-based technology on the job, students are finding that they are not as prepared as they should be upon graduation (McAulay, 1993). Study findings suggest that caution is required when making assumptions regarding computer attitude and computer aptitude of college students in computer dependent courses (Karsten & Roth, 1998).

Technology in Higher Education

The evolution of information and communication technology (ICT) into the educational system and the way it has been used by students in higher education has been

divided into three stages according to Katz (2002). The first stage utilized a more flexible or open learning technology with the introduction of spreadsheets and databases. The introduction of spreadsheets and databases in the educational process contributed to the promotion of improved learning and instruction and increased effectiveness in the educational process. The next stage of development was the introduction of simulations and realistic models of subject matter as experienced in real life situations. This increased the student's understanding and mastery of the subject matter and helped to close the gap between theoretical subject matter and the applications of knowledge to real life situations. In the present stage of ICT-based educational development, multimedia approaches have become the main component of the educational process, which has influenced the development of distance learning through the use of radio, television, interactive video, electronic mail, and the world-wide web. This third stage of development has redefined teacher-student interaction by way of online Internet-based instructional and learning packages (Katz, 2002).

Social Technology

Students in higher education today represent the first generation to have grown up with this third stage of multi-media information and communication technology. They have spent their entire lives surrounded by computers, video games, MP3 players, cell phones and other social, digital, communication technology devices (Prensky, 2001). In the early days of technology, students were often not able to keep up with the rapid advances of technology. Today, students come to colleges and universities already having developed advanced computer and technological skills (Olsen, 2000). ICT allows for instant and easy communication, increased student-teacher interaction and increased

opportunities for real-world interactions outside the classroom. Along with the benefits of ICT, however, come many challenges that college and university professionals need to be aware of and must address. One of these challenges is the student's focus on multi-media, social communication technology representative of the two later stages of ICT rather than on the technical, office-based technology, representative of the first stage of ICT.

Aptitude and Attitude

Technology and the way it is used by students and higher education institutions has developed and changed rapidly over the past several years (Prensky, 2001). The college students of today are composed of several generations, each with various levels of technological skills. These generations include, but are not limited to, the Baby Boomers, born 1943 – 1960, the Generation Xer's, born 1961 – 1981, and the Millennial Generation, born 1982 – 2002 (Howe & Strauss, 2000). These generations have different backgrounds, experiences and expectations of technology and of higher education (Vailles, Phillips, Rosenblatt, & Vargas, 2005). Technology served as a liberating tool for the Boomers, a diversifying tool for the Gen Xers, and a unifying tool for today's teens or the Millennials (Howe & Strauss, 2000). Today's college students have technological proficiencies far greater than previous generations dating back 20-25 years. Ownership of technology tools has become a generational status symbol. Millennials are as familiar with computers as Baby Boomers were with television. However, the Millennials are using technology to do group projects and communicate among networks of friends. Equipped with Instant Messaging (IM) and 'buddy lists,' Millennials stay in

almost uninterrupted contact with each other, far beyond anything the Boomers or Gen Xers ever experienced with the technologies of their own childhood or teen years.

Much has been written about the technological savvy of the Millennials and their entrance into college (Howe & Strauss, 2000). Assumptions have been made regarding the need for technology training for this generation including whether or not additional training is necessary. The communication or social technology of this generation far exceeds the abilities of earlier generations, including many faculty, however, the specialized, office based or technical technology skills seem to be lacking to the extent that it could impact the vocational success rate of college graduates if not addressed (Prensky, 2001).

As technology continues to change and as students continue to become more technologically advanced, administrators and instructors must recognize student limitations to different types of technology expertise and address those deficiencies in college curriculum. This research examined college student perceptions of aptitude and their attitude toward social (communication) and technical (office-based) computer technology with respect to age, gender, ethnicity, class standing, and academic major.

Statement of the Purpose

The purpose for conducting the study was to explore college student's perceived capability regarding specific technical technology skills and knowledge. Specifically, the study explored the perceived aptitude and attitudes of university students majoring in apparel merchandising and design as well as other related and non-related majors toward social and technical computer technology.

Perceptions of aptitude and attitude toward social and technical computer technology were measured using a modification of an existing computer self-efficacy survey and a computer attitude scale to include the tendencies toward social as well as technical technology. The participants for the investigation were college undergraduate apparel merchandising and design students and students from other related and non-related majors. Once students completed the attitude and aptitude survey, independent samples *t*-tests, one way analysis of variance (ANOVA), and correlations as well as frequency and percentage distributions were used to analyze the data with respect to age, gender, ethnicity, class standing, and academic major to determine student tendency toward social or technical computer skills. This could help educators make better informed curriculum based decisions regarding course content of computer courses in higher education as well as possibly impact the success rate of college graduates in their chosen vocations.

Statement of the Research Questions

Students in apparel and merchandising programs are expected to have technical, office-based technology skills not only to perform class assignments, but also to prepare for the next level of computer instruction in specialized software applications. Without this technical technology ability, the success rate is greatly diminished when utilizing specialized software. Industry expects graduates to have a good understanding of technical office-based computer technology to be successful in the business environment. By measuring the attitude and aptitude of students to assess their perceived social and technical competencies in computer technology with reference to their age, gender, ethnicity, class standing, and academic major, there could be implications for future

instructional methods as well as vocational decisions. Four research questions were addressed in the study:

1. Research Question One: What was the (1) perceived aptitude of college students toward the dependent variables of (A) social and (B) technical computer technology based upon the independent variables of (a) age, (b) gender, (c) ethnicity, (d) class standing, and (e) academic major?
2. Research Question Two: What was the (2) attitude of college students toward the dependent variables of (A) social and (B) technical computer technology based upon the independent variables of (a) age, (b) gender, (c) ethnicity, (d) class standing, and (e) academic major?
3. Research Question Three: Were there significant differences between social technology and technical technology perceptions of competency in college students?
4. Research Question Four: Was there a correlation between perceptions of (1) aptitude, (2) attitude and (A) social or (B) technical competencies of college students?

Definitions

1. Advanced Construction Technology: technologies that require more specialized knowledge to operate and use: Web authoring software, digital graphics packages and tools, programming software (Ching, Basham, & Fang, 2005).
2. Aptitude: any characteristic of a person that forecasts the probability of success under a given treatment; whatever makes a person ready to learn rapidly in a particular situation or to make effective use of a particular environment; working

on any particular body of instructional material and with any instructional procedure, students are presumed to differ in their expected rate of learning. (Cronbach, 1977). Psychological constructs about individual differences in learning or performance in specified situations (Snow, 1980).

3. Attitude: a positive or negative sentiment or mental state that is learned and organized through experience and exercises an influence on the emotional responses of an individual toward some other individual, object or event (Palaigeorgiou, Siozos, Konstantakis, & Tsoukalas, 2005). A learned pre-disposition to respond in a consistently favorable or unfavorable manner with respect to a given object (Fishbein & Ajzen, 1975).
4. Communication Technology: technology used for some form of communication, synchronous or asynchronous, text- or voice-based, conducted via computer or handheld: e-mail, chat, cell-phones, message boards (Ching, Basham, & Fang, 2005).
5. Competency: the capability or ability to do a task (Collin, 1992).
6. Computer aptitude: the cumulative effect of exposure to computers and related events (Palaigeorgiou et.al, 2005).
7. Computer Attitude: a person's general evaluation or feeling of favor or antipathy toward computer technologies and specific computer related activities (Palaigeorgiou et.al, 2005).
8. Computer Literacy : the ability to demonstrate basic familiarity with computer hardware, operating systems, and file concepts as well as a working knowledge of a word processor, spreadsheet, and database program with the ability to use the

Web and e-mail (Selber, 2004); an understanding of computer characteristics, capabilities, and applications, as well as an ability to implement this knowledge in the skillful, productive use of computer applications (Smith & Necessary, 1996); the knowledge of the capabilities, limitations, applications and implications of computers (Geissler & Horridge, 1993).

9. Construction Technology: technologies that have the function of making or manipulating digital artifacts from Web pages and digital images to spreadsheets and text documents: Web authoring software, digital cameras, scanners, PowerPoint (Ching, et al., 2005)
10. Entertainment Technology: technologies used for recreational purposes: computer or video games, DVD players, digital music technologies (Ching, et al., 2005).
11. Gaming Technology: technologies designated for gaming and having no other function: computer games, console games, game systems (Ching, et al., 2005).
12. Generation: a society-wide peer group, born over a period roughly the same length as the passage from youth to adulthood, around 20 – 21 years, who collectively possess a common persona including attitudes about family life, gender roles, institutions, politics, religion, culture, lifestyle and the future; perceived membership in a common generation; common beliefs and behaviors; and a common location in history (Howe & Strauss, 2000).
13. Information Technology: skills associated with an individual's use of computers, software applications, databases and other technologies (Banta & Mzumara, 2004); using the Internet for research purposes, using e-mail and chat rooms for

school, using word processing and spreadsheet software, and programming in computer languages (Flowers & Zhang, 2003).

14. Millennials: the latest link in the generational chain defined by their self-image, beliefs and behaviors, and location in history; the millennial persona includes being special, sheltered, confident, team oriented, achieving, pressured, and conventional; born in 1982 to the present (Howe & Strauss, 2000).
15. Net Generation: the Baby Boom Echo generation of children who were born between 1977 and 1997, which coincided with the digital revolution producing a generation of social transformation (Tapscott, 1998).
16. School Technologies: technologies that might be used in an educational context, including many items that had been placed in the construction and communication technology categories and some that did not fit any of the other technology categories: word processing, e-mail courseware, PowerPoint, spreadsheets, search engines (Ching, et al., 2005).
17. Self-Efficacy: an estimation of one's ability to successfully perform specific behaviors to produce outcomes (Murphy, Coover, & Owen, 1989).
18. Social Networking Site: online sites where users can create a profile and connect that profile to other profiles for the purposes of making a personal network; examples of such sites include Facebook and MySpace (Lenhart & Madden, 2007).
19. Social technology: refers to computer mediated communication environments that connect people for cooperation, collaboration, and information sharing resulting in a dynamic on-line community. Weblogs, wikis, forums, instant

messaging, and e-mail are forms of social technology that facilitate information sharing and online community information (Lamb & Johnson, 2006).

20. Technology: innovation in action involving the generation of knowledge and processes to develop systems that solve problems and extend human capabilities (Kleinglass, 2005).

Assumptions

The underlying assumption of the study was that perceived college student aptitude and attitude of both social and technical technology can be measured. Following were additional assumptions of this study.

1. Students come to college with an extraordinary amount of social technology skills and are confident in those skills.
2. Students surveyed are representative of the sample being studied.
3. Student's perception of aptitude and attitudes toward technology influence their use of that technology.
4. Perceptions of aptitude and attitude can be measured.
5. A self-reporting of aptitude and attitude perception is a reliable indication of aptitude and attitude perception.
6. Reliable results can be obtained using a survey measurement tool.
7. Student perceptions of aptitude and attitude toward technology use influence the curriculum planning process as well as their future employment.

Delimitations and Limitations

The consequences or delimitations of studying college student perceptions of aptitude and attitude of both social and technical technology could result in changes in

college curriculum. This study could impact not only student's academic careers but their professional careers as well by helping to ensure student success. The study could also impact employers by providing them with more competent and qualified graduates. Following is a list of accepted limitations to this study.

1. The study was limited to the University of Arkansas.
2. The study was limited to apparel merchandising and design students and related and non-related majors at the University of Arkansas.
3. The study was limited to undergraduates according to age, gender, ethnicity, class standing, and academic major.
4. The study did not take into account socio-economic differences.
5. The study did not take into account computer anxiety differences.
6. The study was limited to perceptions of social and technical computer technology aptitude.
7. The study limited computer attitudes to social and technical experiences.

Significance of the Study

Technology has had an intense impact not only on colleges and universities, but also on university students (Aviles, Phillips, Rosenblatt, & Vargas, 2005). Students come to colleges and universities already having developed advanced computer and technological skills and it is the schools that are often not able to keep pace with the technology (Prensky, 2001). Students have changed radically and are no longer the people the educational system was designed to teach. They have spent their entire lives surrounded by and using technology. As a result of this environment, today's students think and process information differently from their predecessors (Prensky, 2001).

Each generation throughout the 20th century has been given their own label and identity including characteristics, attitudes and beliefs. The Millennials, the generation born after 1982, have been given the additional label of the Net Generation due to their technological savvy (Zis, 2002). These students are more comfortable with technology than their parents or their teachers and expect access to and availability of technological resources on campus. According to Tapscott (1998), the Net Generation will experience life much differently than their baby boomer parents, with a greater focus on more interactive internet-based media in the classroom rather than the more traditional broadcast media. They will use the computer to interface with their activities in work, play and school. The concern is that there has been an over generalization of this perceived computer confidence and knowledge to all students in this generation (Tapscott, 1998; Dorman, 2000). The impact of the perception that all college students are technologically skilled, both socially and technically, affects not only the students' ability to perform in the classroom and eventually on the job but the instructor's ability to teach and the employer's ability to hire skilled employees.

Computers play a crucial role in education and business, causing the question of what constitutes computer literacy or aptitude to be more crucial than before. The rapid pace of technological advances in many industries, including the apparel industry, has forced businesses to demand a computer-literate workforce (Smith & Necessary, 1996). By measuring the perceived computer aptitude of college students toward basic office software applications, the student, faculty and employer will gain a better understanding of the student's technological capabilities regarding specific computer related knowledge and skills, enabling them to be more productive in school and work.

Net Generation college students have grown up with technology. Access to computers and technology for the majority of entering college students is through the home. Their perceived aptitudes and attitudes toward technology differ based upon their demographics. Race, gender, age, education level and family income influence the type of access students are exposed to, which in turn influences their attitudes and competencies toward computer technology (Oblinger & Oblinger, 2006).

The type of technology skills they utilize also differ, with some having more tendencies toward social technology while others have more tendencies toward technical technology. The Net Generation has been exposed to multiple media types from a young age and is more visually literate than earlier generations. Educators often overlook the social nature of this generation as an important technique to incorporate into the classroom (Oblinger & Oblinger, 2006). Many secondary and postsecondary institutions are incorporating Instant Messaging (IM) as a resource for communicating with students (such as for campus safety). Technology use, however, extends beyond IM and other sources of socialization.

The successful integration of computers in educational environments depends to a certain extent upon the student attitude toward them (Palaigeorgiou, et al., 2005). Due to the increased use of personal computers in classrooms on university campuses, many students are faced with mastering a tool that may appear threatening to them from a technical standpoint. According to Walters and Necessary (1996), there is evidence that many individuals are optimistic about the benefits of computers, other research focuses on the concerns and problems that come with computer use, including computer phobias, technostress, loss of privacy, depersonalization, and fear. This could lead to a concern

that a negative attitude toward computers might affect individual motivation and performance both in school and on the job.

Technology has influenced and changed the Net Generation from previous generations and is now changing higher education (Oblinger & Oblinger, 2006). This study researched the tendencies of students toward social or technical computer competencies based upon specific demographic characteristics of age, gender, ethnicity, class standing, and academic major with implications for accrediting bodies, higher education administration, faculty, students, and employers who could be affected by this generation's technological attitudes and aptitudes. Accrediting bodies can accurately assess the technological offerings of apparel merchandising and design programs with documented student competencies resulting from this study. Higher education administration and faculty could be impacted with the knowledge needed to develop and implement more meaningful curriculum in apparel merchandising and design programs. Employers could be more satisfied with the competencies and qualifications of apparel merchandising and design graduates. Students could benefit the most by receiving the needed technology exposure for successful academic and vocational careers.

Theoretical Framework of the Study

The relationship between technology and student development theory has been limited as most theory was developed before the abundance of technological devices. In addition, there are a number of student learning and personality studies, as well as research on aptitude and attitude in existence today. For the purpose of this study, the following two theories relate to the theoretical framework of the study: Fishbein's Learning Theory of Attitudes and Beliefs based on the application of a learning theory as

it relates to attitude and behavior; and John Holland's Theory of Personality Types and Model Environments based on the assumption that the choice of a vocation is an expression of personality.

Fishbein's Learning Theories of Attitudes and Beliefs

Fishbein (1975) defined beliefs in terms of the probability that a given object is related to some attribute. If the object is viewed as a stimulus, and the related attribute as a response, a belief about an object corresponds to the probability that the stimulus elicits the response. According to a behavior-theory approach, belief formation should follow the laws of learning. Whenever a belief is formed, some of the evaluation associated with the response constitutes an attitude, which may have been formed as the result of prior learning. The implication of this conditioning paradigm is that attitude toward an object is related to beliefs about the object.

Fishbein made this relationship an explicit part of his theory of attitude, which can be described as:

1. An individual holds many beliefs about a given object, (that is the object may be seen as related to various attitudes such as other objects, characteristics, goals, etc.).
2. Associated with each of the attributes is an implicit evaluative response or attitude.
3. Through conditioning, the evaluative responses are associated with the attitude object.
4. The conditioned evaluative responses form a cumulative effect.
5. Thus, the attitude will elicit a response, which constitutes the overall attitude.

According to the theory, a person's attitude toward any object is a function of beliefs about the object and the evaluative responses associated with those beliefs. Fishbein's learning theory of attitudes and beliefs guided this research in determining the perceived aptitude and attitude of college undergraduates towards social or technical computer technology. The data collected and resulting conclusions could contribute to the body of existing knowledge by identifying social and technical characteristics an individual may possess toward technology.

John Holland's Theory of Personality Types and Model Environments.

There are many theories of personality type, including John Holland's theory of personality types and model environments as related to vocation choice, based on Jung's Theory of Personality. Understanding personality type can shed some light on why students respond differently to different types of media.

Holland's theory assumes that the choice of a vocation is an expression of personality, thus reasoning that interest inventories must be personality inventories. Holland assumed that individuals in a given occupation tend to have similar personality styles and individuals tend to enter specific occupational environments because of their interests and personalities, remaining in those occupations due to the reinforcements and satisfactions obtained through the interactions in that environment. Holland also suggested a relationship between interests and aptitudes using the illustration that if an individual has interests similar to someone in Chemistry that they would probably have the abilities or aptitudes that were consistent with those likes and dislikes. The three basic assumptions for the theory are:

1. Individuals tend to resemble one or more personality types or clusters of personal attributes used to assess the individual.
2. The environments in which people live tend to resemble their personality type.
3. Person-environment similarity tends to be associated with satisfaction, productivity, creativity, personal stability, and vocational stability and satisfaction.

The theory assumed there are six personality types, six parallel model environments, and that person-environment equivalence is associated with a variety of outcomes. The theory attempted to explain these assumptions by assessing a person's resemblance to each of the six theoretical personality types. Holland maintained that by late adolescence most people resembled a combination of these six vocational personality/interest types (Spokane & Cruza-Guet, 2005). The theory claimed that most people resembled more than one type and to some degree all of the types. An individual's personality was a composite of several of the types with each individual having a unique combination. The first three letters of each individual personality type are the dominant personality types and were used in the assessment. Individuals with similar codes typically showed similar patterns of vocational preference and tended to prosper in similar occupational environments.

An individual's personality type is the product of a life history and is in many ways learned (Bis;hop-Clark & Wheeler, 1994). Holland's theory proposes that individuals tend to select and enter college major environments and occupational environments similar to their personality types.

The theory is a structural-interactive or typological-interactive theory. It is structural or typological because it attempts to organize a large amount of information about people and jobs. It is interactive because it assumes that many career and social behaviors are the outcome of people and environments acting on one another. It assumes that all people look for enjoyment and seek to reach goals that utilize talents, skills and interests. A typology that includes six personality types, six corresponding occupational environments, and their interactions is offered as a tool for understanding work histories, vocational satisfaction, achievement, and vocational interventions as well as for organizing and interpreting personal and occupational data.

Fishbein's Learning Theories of Attitudes and Beliefs and John Holland's Theory of Personality Types and Environments guided this research in determining the perceived aptitude and attitude of college undergraduates toward social or technical computer technology. The data collected and resulting conclusions could contribute to the body of existing knowledge by identifying social and technical characteristics an individual may possess toward technology.

CHAPTER II

Review of Related Literature

General Introduction

Students entering college today are expected to be more technologically literate than their counterparts in years past, however, the types of technology experience students have greatly impacts their success rate in college (Karsten & Roth, 1998). Required computer programs specify that entering students must arrive on campus prepared to use a computer and its software applications (Twale & Schaller, 2003). The university assumes that all students have technological savvy. At most institutions computer usage and Internet access continues to be an essential part of student coursework, assignment preparation, term paper research, and overall student success.

Students arrive on campus fairly capable of using Windows, word-processing software, the Internet, and electronic mail (Olson, 2000). However, fewer students arrive with spreadsheet, database, or presentation software capability. Information technology in the classroom was intended to enhance student academic success. Networks are being used instead to entertain members of the "Facebook Generation" who text-message during class, talk on their cell phones during labs, and listen to iPods rather than guest speakers in the wireless lecture hall (Bugeja, 2006). Technology such as cell phones, Instant Messaging, Facebook, MySpace and other social networking technology has become widespread in today's college undergraduate society (Olson, 2000).

Assumptions made regarding the type of technology experience undergraduates have should be examined. These assumptions have important implications for introductory technology courses as well as more advanced specialized technology in

specific programs. Vocational choices could be impacted with the type of technological savvy a college graduate has. The purpose for conducting this study was to explore college student's perceptions of capability regarding technical technology. This research examined the perception of aptitude and attitudes of college students toward social and technical technology with regard to age, gender, ethnicity, class standing, and academic major. Specifically, the study explored the perceived aptitude and attitudes of university students majoring in apparel merchandising and design as well as related and non-related majors toward social and technical computer technology.

Description of Materials Location

The material used for this literature review was collected using the University of Arkansas Library Web Page, (www.uark.edu, Libraries), Electronic Resources and included Database, InfoLinks and Inter-Library Loan searches. Numerous Internet searches provided additional sources for related literature.

The review of literature began with a search of databases including Ebsco Academic Search Premier, ProQuest Direct, ProQuest Digital Dissertations, and ERIC.gov. ProQuest, Ebsco, and Eric.ed.gov proved to be the most useful databases, using the key words: higher education, college students, computers, attitudes, and aptitudes. Additional searches for technology in apparel merchandising and design programs included the keywords textile, clothing, apparel of fashion and computer aided or computer assisted or cad or cai. Searches for social technology included the keywords: Facebook, MySpace, Instant Messaging, Blogging, Electronic Mail and Internet.

Periodicals were also included in the search. Journal articles were found on the Library's InfoLinks system using journal titles. Key journals included the Journal of Research on Computing in Education, Journal of Computer Assisted Learning, Clothing and Textiles Research Journal, Home Economics Research Journal, Journal of Family and Consumer Sciences Education, Educause and Journal of College Orientation and Transition. Several book searches were done on InfoLinks by author and/or title. The searches resulted in numerous books on the theoretical aspect of the research as well as subject-based results on student generations, technology, computer-aided-design and the apparel industry. Other sources of information came from visually scanning the stacks on the third and fourth floor of Mullins Library in the surrounding subject area of periodicals and books that were located; scanning the reference lists from key published and unpublished dissertations and journal articles; and using current textbook publications from the Apparel Studies and Education curriculum at the University of Arkansas. This process proved to be successful and was appropriate for the subject matter being researched.

Organization of Review of Literature

The review of literature in this chapter was divided into six major sections: (1) technology in higher education; (2) technology in apparel merchandising and design programs; (3) how college students use technology; (4) technology as a personality variable; (5) aptitude and attitude toward technology; and (6) a chapter summary. The first section reviewed literature related to the development, integration and risks associated with technology. The second section reviewed the growth and development of technology in apparel and merchandising programs and the problems associated with that

growth. Literature reviewed in the third section emphasized research conducted in the student use of various technology forms both technically and socially. The fourth section addressed issues with technology use today. The last section reviewed literature with regard to student attitudes and aptitudes toward technology. A chapter summary ties aspects of the literature review together.

Technology in Higher Education

Technology has existed since the first human began to seek control over the environment (Kleinglass, 2005). The exponential growth of technology continued at an increasing rate, with technological influences being integrated and used by society more quickly than in the past. With the introduction of the Internet in 1984 and finally wireless communications in 2001, the use of technology has exceeded other inventions such as the printing press, telephone, or television (Kleinglass, 2005).

Many changes today were not envisioned in the early nineties, with information technology changing work, play and learning (Kleinglass, 2005). According to Murray, (1997) technology has become the largest line item in university budgets, making the ability to stay current in the educational system a constant challenge. The ability to understand the effects of information technology in relation to student development and the skills needed to use that technology are of the highest priority (Kleinglass, 2005). Millennials have grown so accustomed to technology that they expect it as a standard tool along with well-developed systems in place to operate it. Technology has been taken for granted by college undergraduates. (Murray, 1997). It seems, according to Flowers, Pascarella, and Pierson (2000) that computers and information technology are changing the way teachers teach and students learn. Technology will have a profound impact on

both the mission and the function of the university and total student college experience (Kleinglass, 2005).

A review of the literature revealed many studies conducted in the area of computer technology and higher education. The following categories were determined relevant to this study and are discussed in this section of technology in higher education: computer-based vs. text-based instruction; computer programming; technology as entertainment; technology in new student orientation programs; technological skill level of students in community colleges; instructional and administrative technology use; and web-based vs. hand written survey methods. A discussion of information technology concludes this section. Ethnicity, Internet addiction, the digital divide, computer anxiety, age, and gender as related to computer technology will be discussed in the last section of the literature review, technology as a life variable.

Computer-Based vs. Text-Based Instruction

Kuehner (1999) studied the effectiveness of computer-based and text-based instruction on remedial reader's skills and attitudes toward instruction at the community college level. Research subjects were community college students enrolled in two developmental reading courses taught by the same instructor. Students completed 18 hours of lab work and were tested at the beginning of the semester using a standardized reading test. After the students completed the lab work, they were given post-tests. The computer and text programs were as similar as possible. The pre- and post-test scores were analyzed to determine if the students' reading skills had improved over the course of the semester. A paired t-test revealed the students had no significant differences in reading skill. To determine attitudes toward each program, students completed a ten-item

questionnaire. Few differences were seen in students' opinions about the two programs in terms of ease of use, effectiveness, or interest. The study found no significant differences in the two groups' reading skills or attitude, although the computer users were able to read more efficiently.

Computer Programming

Strategies were developed by Guzdial (2002) for teaching introductory computer programming in higher education. This study proposed a new strategy for teaching introductory computer programming to attract students into a diverse, well-educated, large work force of computer science professionals. Engagement of students using the technology media that they associate with would allow them to better learn computer programming skills. The study concluded that to keep this Nintendo Generation in computer classes today, instruction must use the media that the students use.

Technology as Entertainment

Using technology as entertainment in a vocational learning environment, a model was developed with a technology base that motivated students and improved graduation rates as the result (Landt, Knazze, & Sud, 2001). The model focused on average students, created an "edutaining" experience, produced positive results and served as a model for other institutions. A three-year curriculum was planned with standards set up for state public school systems, and set to meet not only higher education standards but industry standards as well. Sixteen computer labs were set up with a partnership between Daley College, Gage Park High School, and the Associated Equipment Distributors Foundation (AEDF). The labs were used to train students at the Equipment and Technology Institute in industrial vocations while integrating computer technology with

classes in electricity, hydraulics, diesel engines, and safety. A major key in the model was the edutainment factor: the deep student engagement the program created in its combination of technology and grease. Students experienced the fascination and power of technology with hands-on work. Using the power of the computer to manage machinery became a unique motivator for students.

Technology in New Student Orientation Programs

New student orientation programs on college campuses have had a direct link to entering students. An exploratory study to determine academic content of new student orientation programs in four-year colleges with respect to technology integration was conducted by Miller and Viajar (2001). An 18-item survey was given to a random sample of 100 orientation professionals selected from the National Orientation Directors Association (NODA) Membership Directory using a table of random numbers. Sixty-seven usable surveys were returned. Seven questions had overall mean ratings of agreement to strong agreement providing a look at what orientation directors were concerned with when programming orientation sessions. The highest rated item was to provide students with university e-mail accounts immediately upon arrival on campus, followed by: emphasis on the importance of technological competence; having computer workstations for pre-registration at orientation; giving online demonstrations on how to utilize university services; providing virtual tours of campus prior to the student's arrival; having special sessions on technology support; and making chat-rooms available for new students to ask questions of orientation team leaders.

Technological Skill Level of Students in Community colleges

A later study by Miller and Pope (2003) further investigated the integration of technology into community college orientation programs. This study measured the technology expertise and skill levels that new students have when they arrive on campus with regard to student technology expectations. The primary question was how technology should be integrated into new student orientation. The survey instrument was an adaptation of the instrument used in a previous study by Miller and Viajar (2001) in their study of four-year college orientation programs. The sample used for the study included 225 community college orientation and student affairs professionals randomly selected from the membership of the National Orientation Directors Association (NODA). Means and standard deviations were applied to achieve the final results. As in the previous study, seven strategies were identified as potentially effective with the number one rated strategy to provide students with college email accounts immediately when they arrive on campus. This suggested a need for some technology exposure at the community college level as well as four year institutions

An additional study on technology in Community Colleges identified how community college students are involved in campus, how they use technology, and what kinds of skills they use to be successful in their studies and interactions with peers and faculty (Miller, Pope, & Steinmann, 2005). Data were collected for the study using a study-specific, literature-referenced survey instrument. Six community colleges were identified from around the United States based on their willingness to participate. A total of 300 surveys were distributed to all the campuses with 272 usable surveys returned. Means and standard deviations were applied to get the final results.

The first section of the survey dealt with the extent to which community college students were involved in campus life. The findings suggested that while computer resources might be utilized, students were finding opportunities to engage themselves with others away from campus, indicative of a traditional commuter community college student. The second section of the survey included items that dealt with techniques of technology use by students with results consistent with the general expectations of an academic environment, whether at the secondary or post-secondary level. Students used technology to facilitate coursework, but were less likely to involve themselves in more technical aspects such as computer programming. The final section of the survey included life skills identified through research and consultations with community college officials. These responses indicated a traditional community college student was still active on campus, taking advantage of the easy access to higher education. This suggested that community colleges are competing for the same markets as other higher education markets and must be cautious in continuing to serve their local community.

Instructional and Administrative Technology Use

A Delphi survey of 29 faculty senate leaders with regard to how faculty should be involved in planning for the use of instructional and administrative technologies was conducted by Rice and Miller (2001). The participants were randomly identified based on institution with similar governance units in place. The statements with the highest mean ratings concluded that faculty would be more inclined to use technologies if they were involved in the decision-making process about them.

Web-Based vs. Hand-Written Survey Methods.

The purpose of a study by Carini, Hayek, Kuh, Kennedy, and Ouimet (2003) was to determine whether mode effects were associated with responses of undergraduate students to a national survey administered via paper questionnaire and via the Web. The National Survey of Student Engagement (NSSE) annually collected information from first-year and senior students at several hundred four-year colleges and universities. The target sample for this study included 151,910 students from 276 four-year colleges and universities. The results of this study were based on 58,288 student responses, with 37,682 completing the paper version and 20,606 completing the Web version. Using ordinary least squares (OLS) regression to examine whether the two survey modes (paper or Web) affected average responses, the results indicated small distinctions between the two.

The findings suggested that mode effects for first-year and senior college students generally tend to be small. There was a notable exception with items related to computing and information technology, which exhibited more favorable responses when answered via the Web. This study emphasized the need to carefully evaluate issues of sampling, non-respondent bias, and measurement error when interpreting the findings from Web and paper surveys.

Technology

A large scale study by Flowers, Pascarella and Pierson (2000) on the net cognitive impacts of information technology use in postsecondary education suggested that the cognitive impacts of information technology may vary for different kinds of students and in different types of institutions. In addition, different types of information

technology have different impacts. The researchers focused on the extent of computer use and the extent of e-mail use. The sample consisted of incoming first-year students at 18 four-year and 5 two-year colleges and universities in 16 states. The data collection was conducted with 3,840 students reporting from the 23 institutions using a Likert-type questionnaire. The researchers used a regression analysis to determine the significant predictors of computer and e-mail use during the first year of college with all other variables being analyzed. These variables included: pre-college characteristics; cognitive development at the institution attended; academic and non-academic experience of college; the direct effects on cognitive outcomes; and the presence of conditional effects of computer and e-mail versus the other variables. The findings of this multi-institutional investigation of computer and e-mail use and their cognitive impacts during the first year of college led the researchers to several conclusions: (1) four year colleges use significantly greater computer and e-mail technology than at two year colleges; (2) there were similarities in both types of institutions in the factors influencing information technology use with little influence from previous cognitive experience, sex, and socioeconomic status; (3) substantial and significant differences existed between students in two-year and four-year colleges in the impacts of both computer and e-mail use on the end of year cognitive outcomes; (4) computer use had positive impacts on first year cognitive development however the effects of e-mail use were significant and negative for all cognitive outcomes for students in two year institutions; there was no significant impact on the cognitive development of first year students at four-year institutions; and (5) the cognitive impacts of computer and electronic mail use differ in magnitude for different kinds of students. The overall results of the study found that effects of specific

information technologies interacted with learner characteristics or learning orientations. The challenge remains to find the best fit between information technology applications and student capacities to use them effectively. This study was the first large scale investigation to estimate the net cognitive impacts of information technology use in postsecondary education.

Other studies relevant to technology use in higher education include a student versus search engine study by Nowicki (2003). This study investigated six popular search engines to determine their effectiveness in returning results relevant to college students needs. For this experiment, 75 undergraduates in Composition I and II classes during the fall of 2000 queried six search engines using a pre-experiment questionnaire, directions for ranking the search engines, and search forms. The Pearson Product Moment Coefficient was calculated for each student ranking, using spreadsheets to determine strong or weak relationships. The overall mean was calculated by averaging all the Pearson correlations. There was no significant correlation between students' relevance rankings however the demographic characteristics, computer experience, and information retrieval experience revealed a lack of experience using searches of this type. The researcher noted that past research concluded that novice World Wide Web users were less proficient in locating websites than searchers with more World Wide Web experience.

Further research on Internet usage by the Pew Internet and American Life Project (Jones, 2002) indicated that college Internet users were heavier users of instant messaging and online chat and non-Internet users were less proficient in online activities. A lack of computer skills or a lack of the World Wide Web caused some students to not

complete the study while the inability of some students to construct appropriate search statements contributed to irrelevant results. The final results illustrated the need for information literacy and computer literacy training for students. Students needed training in searching skills, critical thinking skills, technological skills, and website evaluation to be successful in the information age.

Technology in Apparel Merchandising and Design Programs

The textile and apparel industries and higher education must be provided with the information necessary to make informed decisions regarding the direction and scope of technology needed in the future. This specifically includes the use of industry based computer software in both dedicated and integrated undergraduate classrooms in Textiles, Clothing, Apparel, and Merchandising programs.

Textile and apparel related computer-aided-design/computer-aided-manufacturing (CAD/CAM) technology is an integral part of the apparel industry today (Istook, 1992). CAD/CAM technology is constantly changing requiring an ongoing exploration of new technological developments in order for the apparel industry and higher education to remain well informed. This information will enable apparel manufacturers and retailers to increase their competitive position of the manufacturing operation through improved efficiency. Educators and students will benefit by becoming more aware of the use of CAD/CAM technologies in the professional world and will provide graduates of higher education apparel programs with the opportunity to obtain more technologically advanced positions within the industry.

Previous research in the area of computers, higher education, and clothing and textiles curriculum did not focus on CAD software or the integration of that software into

the curriculum. Rather, the focus was on micro-computer usage (Knoll, 1989) and on the attitudes and commitment of home economics faculty toward computers in the classroom. A 1988 study by Sheldon studied the current and projected use of computerized design and production equipment in the apparel industry by surveying designers working for apparel manufacturers to determine acceptance of technology with implications for apparel education. This study found considerable increase in the use of computerized equipment by the apparel industry compared to a 1980 American Apparel Manufacturer's Association study (Sheldon, 1988). According to Sheldon (1988) quick response (QR) efforts prompted by import competition may be the motivation to automate this industry.

Colleges and universities educating future apparel designers and merchandisers must prepare their graduates to work not only in a creative capacity but in a technological workplace as well. According to Sheldon (1988) designers and merchandisers entering the industry in the future will need an understanding of the capability of all computerized design equipment and have hands-on experience with design/illustration and patternmaking equipment. Designers and merchandisers must feel comfortable in a high technology environment and be able to use computers as a tool to develop their creative ideas. Educating design and merchandising students in current technology will provide the apparel industry with designers and merchandisers who are able to function effectively in anticipation of current and future developments and challenges in the apparel industry. Technology both in the apparel industry and academia has changed drastically since these studies were conducted and a current study is needed to plan future higher education clothing, textiles, apparel and merchandising curriculum with emphasis on CAD.

Computer Applications in Higher Education Apparel Programs

It seems appropriate to include a brief summary of computer applications within the apparel industry as well as the current general trends. Computers have been in use in the apparel industry for many years. Larger companies began using computers in the early 1950's for office functions (McPherson, 1987). According to McPherson (1987) during the 1960's the use of computers in the apparel industry expanded greatly and computerized pattern grading and marker making systems were developed followed by computerized cutting, sewing, and pressing. By 1980 there were at least fifteen different types of equipment on the market (McPherson, 1987). Computer-aided-design/computer-aided-manufacturing (CAD/CAM) procedures, software, and equipment evolved within the apparel industry in the 1980's. The current rapid developments in technology have implications for those involved in the education and preparation of textiles and clothing professionals (Collier & Collier, 1990).

It is the students who have to learn, and they will have the best learning experience by interacting with their environment according to Vallender (1992). The educator has to arrange events in such a way that learners are encouraged to interact productively with the CAD system being used. Learning is something that learners have to do for themselves, learning the tools that are available as well as the purpose of those tools (Vallender, 1992). Students have to discover how to use those tools to develop an inquiring attitude towards the use of CAD in simulated solutions to educationally oriented design problems (Vallender, 1992).

Novice fashion students think in different ways, appearing to rely more on each other and themselves to gain information and less on traditional teacher/student roles

(Devane, 1992). According to Devane (1992) students are self-motivated and anxious to take on the technological advances being made within the fashion industry. Their enthusiasm to experience and research with CAD regarding fashion and textiles is real. They have a positive attitude to the systems incorporated into the educational program and can handle sophisticated equipment with great ease (Devane, 1992). As new roles are created within the industry due to increased use of computers for different types of functions, the potential employment market continues to grow rapidly world-wide. Students have found it easy to gain employment because the necessary computer experience is built into their work at college. Development of high quality instructional computer programs in higher education began in the late 1970's (Threlfall, 1995). Apparel and textile educators started using computer simulation for computerized pattern making as early as 1983 (Threlfall, 1995). By using computers educators not only develop the desired skill competencies, but they expose students to various problem-solving methods and cutting edge technology. A new generation of fashion and textile students is emerging. CAD/CAM is no longer a vision; it is reality in the fashion industry and therefore changes have been made to incorporate the introduction of this technology and the implications into education. There have been definite improvements in the skill and knowledge base of students graduating with CAD/CAM experience (Devane, 1992). According to a study by Lee-Kang (1993) the use of CAD software is increasing among undergraduate Textiles, Clothing, and Merchandising (TC&M) programs. TC&M programs were more likely to be involved with higher levels of computer use for instruction. Undergraduate TC&M programs need more updated hardware and software, more computer applications in merchandising and increased

CAD instruction on a regular basis (Lee-Kang, 1993). The growing need for apparel designers and merchandisers with CAD experience calls for apparel design, production, and merchandising courses to be developed within the university curriculum (Threfall, 1995).

Apparel Industry Trends

The late 1980's saw the introduction of a new industry wide strategy called quick response (QR) (Dickerson, 2003). There has not been an industry development since that has created as much interest or publicity. QR is a strategy with the aim of achieving quick and precise replenishment of fast selling merchandise by means of computerized partnerships between fabric suppliers, apparel producers, and retailers (Dickerson, 2003). Companies that participate in this strategy are linked electronically to each other so that they can exchange data electronically, speeding up the process of production. As a result, computer design programs have become increasingly important to the apparel industry during the past decade. Computer technology may become the primary means for survival for U.S. Apparel Manufacturers. The acceptance of CAD technology by apparel manufacturers and retailers was a slow process. High costs and lack of training impeded the timely flow of computerization into the apparel industry. Designing with computer equipment has shortened product development cycles by electronically creating both structural and applied designs. Many previously time-consuming hand manipulations are done quickly and accurately today with CAD systems. CAD is now a necessary business tool (Wolfe, 1998). Fashion schools and universities have been trying to initiate new courses so that merchandising and design students are exposed to new CAD/CAM technologies (Istook and Underwood, 1994). Use of computer technology in the industry

creates the need for exposure at the undergraduate level for a seamless integration of graduates into the apparel industry.

In a study by Yan (1997) theories of innovation were used to develop hypothesis relating market factors to manufacturer's decisions in the adoption of CAD/CAM technologies. CAD/CAM adoption was found primarily to be driven by the market and was affected by the size of the business. Educators and students can benefit by becoming more aware of the use of CAD/CAM technologies in the professional world (Yan, 1997).

A study by Istook (1992) explored then current CAD technology, how it was used by the industry and the sources and forms of training for that technology within the textile and apparel industry. The study found that CAD users tended to use similar types of CAD products and had similar beliefs about the importance of specific training aids. CAD users required significantly more training time to gain proficiency on CAD than was estimated by CAD suppliers to be required. Fashion schools and universities are initiating new courses to expose incoming students to CAD technologies (Istook, 1992). Marking and grading modules were implemented most often due to the obvious savings of time and money as well as improving accuracy (Istook, 1992). CAD/CAM technology has changed greatly during the past decade and raises questions as to the kinds of system choices CAD/CAM consumers are making. Training for the various modules of the CAD/CAM systems has traditionally been time consuming and expensive, taking up to three months of practice to achieve efficiency (Istook, 1992). By allowing higher education to take on this practical application of the CAD systems, retailers and manufacturers are able to hire better prepared and more qualified graduates of apparel

programs and graduates become more competitive for key positions within the apparel industry.

A changing market and new computer technologies have drastically changed traditional merchandising practices for apparel manufacturers and retailers. Using computer-aided-design, the apparel manufacturer works with retailers to develop new lines that can be viewed on the computer and adapted on the screen rather than going through the time consuming stages of making samples to see if designs produce the desired effect. Computer technology has reduced the time required to bring a garment from the conceptual stages to the final product (Dickerson, 2003). Efforts are also being made to make systems more user friendly by integrating Microsoft windows environments that include commonly used icons (Glock & Kunz, 2005). One of the greatest challenges is the development of 3D product development systems that can take a product from concept to the fashion runway using computer graphics (Threfall, 1995). Computer systems are now available to serve the needs of both small and large apparel firms. The past ten years have provided a variety of CAD uses in diverse fields and are vastly different from its early beginnings. Graduates of programs providing experience and knowledge centered on computer-aided-design will be stronger competitors in the workforce. Finding better programs and more efficient ways of using computer-aided instruction in fashion merchandising programs will be a challenge for textile and apparel educators (Threfall, 1995).

Body Scanning is the next generation of technology to be found in the apparel industry. Scanners are available that scan the whole human body in less than six seconds and produce true-to-scale three-dimensional body models within minutes. Uses for the

models include custom fitting apparel, apparel sizing standards development, 3D product development, including apparel, automotive seating and other equipment applications, body shape analysis, animation and graphics, health and fitness management, medical applications and computer gaming immersion (TC_2).

How College Students Use Technology

The new generation referred to as Millennials by Howe and Strauss (2000) will be a different generation than their predecessors, with different values, behaviors, and preferences (Murray, 1997). The newest generation to enter college has grown up surrounded by digital media. The I.B.M. PC was born in 1983, the same year the first of the millennials was born. The computer has always been present in their lives, playing, learning, creating, communicating and working using a computer (Dorman, 2000). Technology must be functional for today's college undergraduate. They are not impressed with technology; they expect it and care only about what it can do for them (Tapscott, 1998).

Today's college students consider the Internet an indispensable tool for their educational experience and demonstrate the impact of technology by using technology tools in a number of ways. They communicate with family, friends, and college professors, perform research and classroom assignments, use it for entertainment, and to enhance the overall personal and social learning experience of college life (Kleinglass, 2005). Colleges have learned to cater to students who expect to use personal computers in the classroom, library, and anywhere they happen to be on campus (Olsen, 2000).

Access to computers for the majority of today's college undergraduates was through the home. However home access to technology was not always equal for

everyone due to variables including race, parental education, and family income. Whether or not they have access to computers and technology, undergraduates still consider access important. Traditionally aged college students (18-22) are digitally literate, connected, have a sense of immediacy, are experimental in nature, are prolific communicators, work in teams, need structure, are image rich versus text rich, and are community oriented. Educating students is the primary goal of colleges and universities, however reaching that goal depends upon understanding the learners (Oblinger & Oblinger, 2006).

Students vary in the uses of their computers. Within the past five years, intense changes have occurred in the way students access and use technology for learning, communicating, and retrieving information. Many students use the Internet as a source for meeting or conversing with others. They listen to music, watch movies, and play games. Students increasingly use technology for course registration, textbook purchases, and library research as well as talk to professors, access financial aid, and find billing information. Students can register a club or organization online and promote that organization through college servers or websites. Many campuses purchase rights to Internet resources that enable students to use self-help guides for financial aid or health matters. Interactive software is available that enables students to have virtual tours of residence halls, to choose roommates, and select residence hall rooms. Ninety percent of all college students have cell phones and over 80% own a computer (Kleinglass, 2005).

It has been shown that undergraduates are comfortable with technology, using instant messaging systems and email to communicate with classmates and professors. Computer gaming is also a popular trend among college undergraduates, helping to

diversify the entertainment options (Olsen, 2000). Studies have shown that for the U.S.–based youth that grew up with the Internet, it is gradually displacing television as their main source of entertainment, communication and education. The number of adult Americans using the Internet increased 50% from 2000 to 2003 with college students the heaviest users (Hoffman, Novak, Venkatesh, 2004).

A study by Vicario, Henninger, Austin, and Chambliss (2002) studied the risks associated with increased reliance upon technology, including e-mail, instant messages, and cellular phones. Sex differences and college major differences were expected on dimensions of e-mail use, the introduction of new technology, and preferences for communication. Five major personality characteristics including agreeableness, conscientiousness, emotional stability, intellect and extraversion were expected to produce varying results with regard to frequency of engaging in technologically advanced forms of communication. Subjects were undergraduate college students aged 17 – 29. A sample of 40 students was taken from a small liberal arts college, a second sample of 25 engineering students was taken from a large university, and these samples were merged with a pre-existing data set of 172 participants from a previous study. The total number evaluated was 237 with a mean age of 19.33. General information was gathered on age, sex, college year, and major. The variables were assessed using a four-point Likert format scale on usage of technology and a second Likert format scale assessing attitudes regarding e-mail and technology convenience. Personality characteristics were assessed using a personality inventory. A median split was used to create low and high groups on the various factors. Results included significance in the conscientious and agreeable personality types with differences between extraverts and introverts found with

regard to e-mail and cellular phone communication. College major and sex produced significant results on communication preferences and behavior.

By analyzing autobiographical essays written by 172 adult college students, a study investigating how coming of age concurrently with the internet and related technologies influenced the lives of the students, providing insight to the usage of the internet for future generations. This qualitative study revealed insights into four primary domains: self, family, real communities, and virtual communities. The participants reported a growing dependency on the Internet for activities ranging from managing their daily lives to building and maintaining virtual communities (McMillan, 2006).

The Pew Internet and American Life Project (Jones, 2002) conducted a comprehensive study that focused specifically on college students' Internet use. The report is based on the findings of two surveys given to college students at two-year and four-year public and private colleges and universities in the continental United States. The final sample of 2,064 surveys had a 95% confidence rating in sampling error. Each student was asked to fill out either a survey about their academic uses of the Internet or their social uses of the Internet. The study found that college students are early adopters and heavy users of the Internet. They are more likely than the general population to be online, check e-mail, use multiple e-mail addresses, browse for fun, download music files, and use instant messaging. They also reported that the Internet has enhanced their education. They use the Internet for contacting professors, conducting research, working on projects with fellow-students, and receiving messages from academic-oriented e-mail services. College students also report that the Internet has changed social life on campus. They use the Internet to communicate socially, for

entertainment, to easily and conveniently stay in touch with friends, and to forward messages to friends and family.

A study by Twale and Schaller (2003) assessed first and second year student perceptions of preparedness and technical competence at entry to use the computer and its software applications. A two-part survey was developed that addressed student perceptions of technical competence, with regard to usage and application. Students were asked about their level of computer access, perceptions of technical competence, computer saviness, attitudes toward the mandatory purchase of a personal computer, familiarity with select computer applications at entry and lately, frequency of usage of specific software for academic purposes, faculty incorporation of the computer into coursework, and benefits derived and problems encountered. There were 338 participants with students evenly distributed across both classes with regard to sex, race, and school and were representative of university demographics. Means, standard deviations, frequencies, chi-square, and paired and independent *t*-tests were used to answer the first research question, while analysis of variance distinguished the differences in demographic data between groups with regard to technical competence to answer the second question.

In response to the first research question, perceived level of preparedness, students indicated that regardless of their perceived level of technical competence at entry, they make gains over time in hardware and software. Students indicated preparation prior to entry as a good idea. The fact that students have the same computer, software, and access level increases the possibility that deficits at entry will diminish during the course of the year. Increased usage implies easier adaptability to their

computer which may contribute to increased competence, but students risk falling behind other classmates who are more savvy and competent. With regard to the second research question, gender differences indicated more men used software applications, the Internet and the web, while women indicated more willingness to ask for help.

Technology as a Personality Variable

Ethnicity, Internet addiction, computer anxiety, the digital divide, age, and gender as related to computer technology will be discussed in this section of the literature review as these variables reflect the human aspect of technology and some of the components associated with personalities and technology. This section ends with a review of social and information technology.

Ethnicity.

Increasingly, colleges and universities expect technological proficiency among their incoming students. A study by Sax (2001) examined how entering college students' technological preparedness, specifically email and Internet use, varies by socioeconomic factors such as race, class, and gender. Data were collected from the 1998 freshman survey at the University of California with a sub-sample of 272,821 first time full time freshmen attending 469 colleges and universities across the United States. The study included students from four racial/ethnic groups: Whites, African Americans, Asian Americans, and Latinos. Descriptive analysis examined how e-mail and Internet use varied by race/ethnicity, income, high school type, and gender. Use of and access to email and Internet were also controlled for family income, parental education and high school type. Multivariate analyses were conducted in two stages for each dependent variable: (1) exploratory regression analysis to examine how technology use might be

influenced differently for each group; and (2) final regression analyses using only those independent variables that added significantly to the prediction of technology use for at least one racial/ethnic group. Consistent with other studies conducted on the general population, this study showed that technological preparedness is driven by socioeconomic factors such as race and class, and in some cases gender. Racial/ethnic differences in experiences with technology persist despite controls for key variables such as parental income, parental education and high school type.

A study by Flowers and Zhang (2003) used data from the 2002 National Student Aid Study (NPASA) to describe the extent information technology use in college differed by race. Information technology was defined as using the Internet for research purposes, using e-mail and chat rooms for school, using word processing and spreadsheet software, and programming in computer languages. The student sample consisted of more than 45,000 undergraduate students attending over 1,000 institutions in the United States. Ethnic groups represented included White, Black, Hispanic, Asian, American Indian/Alaska Native, Native Hawaiian/Pacific Islander and three percent other. Previous research showed that a student's race and ethnicity also impacted information technology use for two-year and four-year college students. Results of this study were consistent with prior research and showed that racial differences do exist in terms of information technology use in college.

Internet Addiction and Use.

Internet addition is becoming more recognized as a new psychological disorder. Previous studies have indicated that some patterns of Internet use are associated with loneliness, shyness, anxiety, depression, and self-consciousness, but there appears to be

little consensus about Internet addition disorder. An exploratory study by Chak and Leung (2004) attempted to examine the potential influences of personality variables, such as shyness and locus of control, online experiences, and demographics on Internet addiction. Data were gathered from a convenience sample of 722 Internet users mostly from the Net Generation using a questionnaire composed of five aspects: Internet addiction tendency; tendency to be anxious and inhibited in social encounters due to shyness; locus of control; Internet use; and demographics of respondents. Each question was based on a 5 point Likert-type scale. Pearson correlation analyses were run to examine the relationship between shyness and Internet addictions; the relationships between Internet addiction and the separate components of locus of control.

Results indicated that the higher the tendency of one being addicted to the Internet, the shyer the person is, the less faith the person has, the firmer the belief the person holds in the irresistible power of others and the higher trust the person places on chance in determining his or her own course of life. People who are addicted to the Internet make intense and frequent online communication via e-mail, ICQ (instant messaging computer program), chat rooms, newsgroups, and online games. Fulltime students are more likely to be addicted to the Internet as they are considered high-risk for problems due to free and unlimited access and flexible time schedules.

Computer Anxiety

A study by Smith and Caputi (2001) attempted to examine the potential influences of personality variables, such as shyness and locus of control, online experiences, and demographics on Internet addiction. This study explored the relationship between computer anxiety and intrusive thought content or distractions. A total of 149

undergraduate psychology students participated in the study in return for partial course credit. The Computer Anxiety Rating Scale (CARS) was used to measure computer anxiety. The Computer Thoughts Survey (CTS-Form C) was used to indicate negative or positive computer learning cognitions and enjoyment cognitions. The Self-Statements About Computers (SSAC) test was used to assess the internal dialogue of individuals prior to and during computer interaction. The State-Trait Anxiety Inventory (STAI) measured anxiety as a stable internal characteristic. Each instrument used a Likert-type scale to collect the data. Data analysis included correlations among computer thought subscales; correlations of intrusive thoughts with computer anxiety and trait anxiety; and analysis of group differences on measures of computer thought. The results were consistent with previous research suggesting that high computer anxious individuals experience more destructive than constructive thoughts. Negative thought patterns and off-task thinking are greater sources of cognitive distractions for high anxiety than for low anxiety computer users.

The effects of computer instruction on computer anxiety have been researched thoroughly; however anxiety was studied while also examining other factors including learning style, gender, intensity of treatment, and computer-related background experience. A study by Ayersman (1996) examined two forms of computer instruction that vary by intensity of treatment in an attempt to determine whether computer anxiety continues to decrease throughout the extended treatments. The sample for the study included 86 undergraduate education majors in a one-credit computer course and 20 undergraduate and graduate student participants in a three-credit computer course at a northwestern state college. The one credit course was an experimental computer course

developed to provide pre-service teachers opportunities for hands-on experience with computers while using them in teaching/learning situations, and required mastery in word processing, databases, spreadsheets, authoring, and telecommunications skills. The second class, a three-credit course was a more extensive version of the same curriculum used in the one-hour course. There were five research questions: (1) to measure the effect of introductory computer training on students' level of computer anxiety; (2) to measure the effect of learning style preferences on differences among computer anxiety levels; (3) to measure the effect of background experiences on computer anxiety; (4) to measure the effect of gender on computer anxiety and background experiences; and (5) to measure the effect of treatment intensity on computer anxiety on pretreatment, post-treatment and degrees of change for the two classes. Two paired *t*-tests were conducted on the first question; four one-way ANOVA's were conducted on the second question; regressions were conducted on the third question; and unpaired *t*-tests were conducted on the last two questions.

The students in both courses significantly decreased in computer anxiety from pre-treatment to post-treatment data collection points, indicating that both courses were sufficient for reducing computer anxiety. There were no significant differences among computer anxiety levels for the four learning style groups within the one-credit hour course at either the pre-treatment or the post-treatment points.

A study by Todman and Lawrenson (1992) investigated computer anxiety and math anxiety in primary schoolchildren and university students as related to general trait anxiety and computer experience. The study considered age-group and sex effects on computer anxiety and math anxiety together with trait anxiety and computer experience.

Thirty-one university students and 65 nine-year-old children of comparable intelligence were given the Raven's Progressive Matrices (RPM) test of non-verbal reasoning. The final sample included 29 nine-year-old boys and girls and 20 university students with a mean age of 18. Four questionnaires were completed for each of the four categories: computer anxiety was measured by Campbell and Dobson's Computer Anxiety Scale; trait anxiety was measured by Speiolberger's State-Trait Anxiety Inventory and State-Traign Anxiety Inventory for Children; math anxiety was measured using a student and pupil version of Richardson and Suinn's Mathematics Anxiety Rating Scale; and self reports of computer anxiety were obtained using a questionnaire designed for the study. A multivariate analysis of covariance and a multiple regression analysis were performed on the computer anxiety and math anxiety data while multivariate and univariate ANOVAs were conducted on math anxiety, trait anxiety, and computer anxiety.

The results of the study were applied to the top ability quartiles of the relevant age populations. The children were less anxious about computers than the students. The children had higher computer experience scores than the students, but this difference did not account for the students' higher levels of computer anxiety. Math anxiety was related to trait anxiety and, for students only, math anxiety was higher for females. The results were interpreted as encouraging indications of the absence of a strong link between computer anxiety and math anxiety, with computer anxiety being reduced as experience with computers became the norm.

Digital Divide

Previous research shows that a persistent digital divide in household computer ownership and Internet access existed that correlates primarily with income. One study

determined the extent of the access gap as well as the factors that influence access for first-year students (Madigan & Goodfellow, 2005). The term digital divide was used to describe the societal split between those with and those without access to computers and the Internet. In this study, all first-year students attending a testing and advising program at two branch campuses of a large university were asked to participate in a survey on their technology skills. Total program participation included 502 first year students. Logistic regression was used to analyze the data.

This sample of first year college students had substantially higher home computer and home Internet access rates than previous studies of the general population. These findings also suggested that first year college students from low-income families had less access to digital technology at home which paralleled existing literature on the relationship between income and the digital divide. First year students with better educated fathers were more likely to have access to digital resources both in the home and at school. This relationship persisted even when income differences were taken into account. There was a notable lack of influence by the mother's educational level. This could have negative implications for single parent families headed by women. The study suggested that first year students from lower-income households with less educated fathers and were non-White were less likely to have computer or Internet access.

Another study by Ching, Basham, and Fang (2005) investigated how college students current levels of technology use might be affected by the digital divide issues. Gender, family income, and early home computer access were significant demographic predictors. The goals of this study were to create a survey instrument that would capture students' use of technology, have a measure of frequency of use, and account for both

frequency and motivation or the value students placed on technology, while accounting for demographics factors and early experiences. One hundred and thirty students from a large midwestern research university and a smaller teaching university in the same state participated in the study. All students came from colleges of education at both universities. A Likert-type survey included questions on hardware such as laptops and computers, MP3 players, calculators, cell phones, scanners, and digital cameras. The survey also included applications: common software such as word processing, spreadsheets, e-mail, and Internet browsers as well as more sophisticated tools for academic courseware, Web authoring, and graphic design. Students rated for use frequency and context importance. A factor analysis was run to reduce the number of variables, then a multiple regression with the factors-grand mean as the dependent variable was run using demographic items, personal history responses, and context importance ratings as predictors. Multiple regression results indicated that male students from higher family income levels who had access to computers at home before age ten showed significantly higher levels of full technology use then other demographic groups. Students' age at first encounter with computers at school had no significant impact on their full technology use.

Age

College students have changed over the course of the history of higher education. Labels have been given to each generation in the 20th century identifying that group with the demographics of the time (Zis, 2002). For the purposes of this research, the generations known as the Net Generation and the Millennials are being reviewed. The Net Generation consists primarily of those people born between 1977 and 1997 (Napoli

& Ewing, 2001). Also known as the digital revolution this generation of people was technologically sophisticated and represented a powerful group of consumers. An exploratory study was conducted examining the lifestyles, attitudes, and media habits of the Net Generation (Napoli & Ewing, 2001). The data collection instrument collected responses from teenagers and young adults with respect to their current media habits, including use of the Internet, attitudes towards advertising, and lifestyle characteristics using a questionnaire. A convenience sample was used to select 90 high school seniors and 154 university students for a total sample size of 244 respondents in Western Australia. A K-Means clustering technique was used on 28 items measuring the activities and interests of the respondents with each statement measured on a five-point Likert-type scale. A one-way analysis of variance (ANOVA) was used to test the differences between groups in their use of broadcast, print, and interactive media and attitudes toward advertising in general. The study showed that the use of the Internet was prevalent among teenagers and young adults in Western Australia, providing some support to the existence of the Net Generation. Four groups were identified based on differences in lifestyle attributes and demographic characteristics: the homebodies had the most positive attitude towards traditional advertising; the armchair athletes were the most negative; the mavericks were the most liberal and the social sophisticates were the most active socially. The social sophisticates and the homebodies tended to use traditional sources of communication while the mavericks and armchair athletes tended to use Internet sources more.

Born between 1977 and 1997, the Net Generation was the first generation to grow up surrounded by home computers, video games, and the Internet. The Internet was the

medium of choice for this generation. Based on the assumption that the Net Generation had unique characteristics, a study by Leung (2004) examined how Net-Geners addicted to the Internet were different from the non-addicted and how these attributes were related to Internet addiction. Data were gathered from a telephone survey with a probability sample of 699 Net-Geners between the ages of 16 and 24 in Hong Kong. Results showed that Net-Geners addicted to the Internet tended to be young female students. Being emotionally open on the Net and heavy users of instant messaging computer programs or ICQ were the most influential factors in predicting Net-Geners problematic use of the Internet. Addicted Net-Geners were also strongly linked to the pleasure of being able to control the simulated world in online games reinforcing previous research that dependents of the Internet spent most of their time in the synchronous communication environment engaging in interactive online games, chat rooms, and ICQ for pleasure or escape while non-dependents used information-gathering functions available on the Internet. Internet addicts tended to watch television significantly less, indicating a displacement effect on traditional media use for the Net Generation.

Gender

Many gender related studies were found in the review of related literature with several of particular interest to this study. Lee (2003) analyzed differences in self-reported IT skills and attitudes of male and female students at the University of Hong Kong, China, by comparing responses of three cohorts of student participants in a campus notebook computer program from 1998 - 2000. Incoming students were surveyed at the beginning of their first year and again at the end of their first year in each cohort using means to test for significance. The concern about gender gap in information technology

and the lack of women participation in computer science has been attributed to different cultural influences between boys and girls. This study showed girls achieved greater improvements in their computer skills than their male counterparts after completing one year of studies. With this recognition of progress, confidence levels were boosted with the young women's estimates of their skill levels doubling over the three-year period. In spite of this acceleration, the girls were less confident of their abilities and possessed lower IT skill levels than boys before starting their university education.

In a related study, (Sherman, End, Kraan, Cole, Campbell, Birchmeier, & Klausner, 2000) research was conducted on the Internet gender gap among college students by comparing the usage patterns and attitudes of three cohorts of students from 1997 – 1999. Eight hundred eighty-nine freshmen and sophomores (69% women and 31% men) completed a survey assessing their Internet usage and attitudes. Data were analyzed in a Cohort X Gender analysis of variance (ANOVA) for each questionnaire item. The cohort companions revealed gender differences in five Internet activities (e-mail, World Wide Web, Usenet, Multiuser dungeons [MUDs] and chat rooms) with no significant decline of these differences over time. Attitudes toward technology also differed between men and women and these differences also did not change over time. This investigation suggested that differences continued to exist between college men and women in how they experienced Internet technology and assessments that the Internet would soon be gender neutral were premature.

The purpose of a study by Imhof, Vollmeyer, and Beierlein (2006) was to learn more about the specifics of computer use by undergraduate university students with particular interest in gender specific differences in computer performance. Forty-eight

students (23 female and 25 male) at the University of Frankfurt, Germany, participated in the study. Each student was given a technology self-efficacy questionnaire, a survey on computer access, a user diary, and a computer task. Means, standard deviations, and percentages were used to analyze the data. Results showed that the gender gap is closing as far as computer access and self-efficacy are concerned. Male and female students reported comparable amounts of computer usage for their studies. However, user behavior appeared to be gender-specific as males spent more time at the computer for personal purposes. There was also evidence that male students outperformed female students at a computer task of re-mastering PowerPoint slides.

Previous studies of sex differences in attitudes towards computers among high school students have shown that differences do exist (Shashaani, 1993). Approximately 1750 ninth and twelfth grade students from five different high schools in Pittsburg, Pennsylvania participated in a survey. Mean and standard deviation were calculated for each statement with differences evaluated using chi-square. Pearson correlations were calculated among related variables to observe any significant associations. The data showed that more boys than girls were interested in computing, had high self-confidence in their ability to use computers, and tended to see the computer as a masculine technology. Both boys and girls equally perceive computers as valuable and useful in society. There was also a strong relationship between students' computer attitudes and their perception of their parents' attitude toward computers.

In a follow-up study, Shashaani (1997) examined the gender gap in computer attitudes and use based on a sample of 202 undergraduate college students enrolled in an introductory computer science course at a private urban university in Pittsburgh.

Students' attitudes in relation to gender, experience and parental encouragement were surveyed using a computer attitude scale. Computer experience was measured by previous coursework students may have taken in high school, frequency of computer use at school, ownership of computers and primary user of home computers. Four unpaired *t*-tests using the pre-test scores and four additional unpaired *t*-tests using the posttest scores were used to analyze the data. Chi-square analysis was used to determine gender differences in relation to pre-college computer experience and Pearson correlations were calculated to measure the associations between each of the independent variables – computer experience and parental behavior and the dependent variable – computer attitude. The results suggested there were significant gender differences in computer attitudes and experience. Females were less interested in computers and less confident than males whereas males were more experienced and had more confidence. Students who knew more about the computer, used computers more, and had more access were also more interested in computers and had more confidence. Further analysis showed that one semester of computer training improved their attitude toward computers. Pre-college experience and parental behavior also were factors whereas students reported that their parents, especially the father, believed men knew more about computers. Young women who perceived their father in this way had less interest and confidence in using computers.

Gender and background characteristics were assessed by McIlroy, Bunting, Tierney, and Gordan, (2001) in relation to computing anxieties and attitudes of first year social studies undergraduates, using the Computer Anxiety Rating Scale (CARS) and the Computer Thoughts Survey (CTS). The sample was comprised of 193 students from

three campuses at the University of Ulster, Northern Ireland, UK and consisted of 157 females and 36 males of comparable age, educational background, ethnicity and grade level. Self-report booklets were distributed to students requesting biographical information and questions related to computing. The two measures, CTS and CARS were analyzed by factors (three in each) and from this analysis some gender differences emerged however were not uniform. This study allowed for more of a microanalysis by examining three individual factors in two separate measures. Consequently, gender differences were identified at a factor level that may have been concealed in previous research. The results suggested that at a factoral level, gender differences persisted even when controlling for a range of measures. The major findings of this study were: (1) a micro-analytic approach to computing attitudes (keeping cognitive and anxiety measures apart and analyzing them by individual factors) was more likely to draw out differences in attitudes; and (2) gender differences were small in effect sizes but not uniform across all measures and factors.

In the Information Age, computer and Internet skills are becoming increasingly important, and those without these skills are at a disadvantage economically and educationally. A study by Schumacher and Morahan-Martin (2001) examined changes in computer experiences among incoming college students from 1989/1990 to 1997. Surveys concerning computer and Internet use and attitudes were administered to 619 incoming undergraduate students. An analysis of variance was run on the combined data with three variables of interest: gender, year, and the interaction of gender by year. There was no significant interaction between gender and year and the year of the survey was found to have no significant effect on any of the quantitative variables. The

comparison of students over an eight-year period from 1989 to 1997 highlights that with increasing overall computer use, gender differences in computer experiences diminished. Males were more experienced than females with computer programming and games and were more likely to own a computer than females, with negative attitudes hampering computer and Internet experience.

Social Technology

Social technology refers to computer mediated communication environments that connect people for cooperation, collaboration, and information sharing (Lamb & Johnson, 2006). Like most tools, there are positive and negative aspects to social technology. Weblogs, wikis, forums, instant messaging, and e-mail are all social technologies that facilitate information sharing and online community networks. The current generation of college students has grown up with the Internet, which has replaced television as the main source of entertainment making it indispensable (Hoffman, Novak, & Venkatesh, 2004). The Internet has become so embedded in people's daily lives that they cannot live without it. An investigation by Hoffman, Novak, and Venkatesh (2004) into the concept of Internet indispensability suggested that as Internet activities become part of the daily routine of individuals and social groups, the Internet became integrated into their lives. The more segments of society that used the Internet in different contexts, such as work, family, and school, the greater its diffusion and potential impact. A related technological aspect was the prevalence of access points for the Internet including work, home, and school. Individuality was the third determinant of activity level. Individual differences, including personality characteristics, needs and demographics were important determinants of online behavior. Many of the activities individuals

engage in online were the seeds for major transformational processes; i.e. a new identity and sense of self. The key outcome for this transformational process was the indispensability of the Internet (Hoffman, Novak, & Venktesh, 2004).

College students were early adopters and heavy users of the Internet according to a study by the Pew Internet and American Life Project (Jones, 2002). College Internet users were twice as likely to use instant messaging and online chat as compared to the average Internet user. Social experiences accounted for a great deal of college student learning outside the classroom and, according to the study, students used the Internet more as a medium for social communication than for educational or professional communication. When asked whom they communicate with most on the Internet, 72% responded with friends and much smaller proportions used the Internet for communication with family or professors. To communicate with friends online, students predominantly used email, but instant messaging (IM) was also widely used. College students checked their email at least once a day, which indicated, according to Jones (2002), that email usage was very much a part of the daily routine for many college students. The analysis suggested that many college students spent between one and three hours online per week in social communication. This indicated a transition from teenage use of the Internet as entertainment to adult use dominated by social engagement and information seeking.

The report, based on the findings of two surveys given to college students at 27 institutions across the US, had implications for college undergraduates. One of the implications of the study was that students have come to expect near universal Internet access. Access to high-speed Internet put the college student in an environment where

they could expect to be in touch with others throughout the day no matter the work or social situation and they could carry that expectation with them after graduation. Another implication was that the college graduate would be well prepared to work in a wired world. Many would be proficient in file sharing and online collaboration. An unresolved question was how much today's college student would rely on online tools to advance their skills and improve their academic credentials. The degree to which college students used the Internet as an information and reference source suggests that they would continue to turn to the Internet for information in the future, more so than previous generations before them. The web had become a foundational piece in their lives.

College and university admissions offices are taking advantage of social technology in their recruitment methods. In the era of Facebook, MySpace and instant messaging, prospective college students are open to admissions recruitment methods that rely on social networking technology according a report sponsored by the Noel-Levitz consulting firm, the James Tower recruiting firm and the National Research Center for College and University Admissions, a nonprofit research organization (Roach, 2006). The 2006 study of 1,000 college bound high school juniors reported on the new ways that colleges and universities were trying to communicate with prospective students. The study's findings reflected the changing face of e-recruitment. The report states that 43% of college-bound students had created a profile on a college or university website similar to Facebook and MySpace social networking sites. Blogs, MySpace pages and podcasts were being used by college bound students to engage in social networking activities that build communities. The data found on these websites provided clearer indications of student preferences for electronic communication and e-recruitment at the university

level. The study also indicated that 63% of students would read a blog authored by a faculty member as a way to seek more information about students and faculty at a particular institution. While e-mail and Internet were the key e-recruitment tools, the survey showed that students were increasingly using technologies such as instant messaging and cell phones.

More than half of all online American youths ages 12-17 use online social networking sites according to a national survey of teenagers conducted by the Pew Internet & American Life Project (Lenhart & Madden, 2007). A social networking site is an online site where users can create a profile and connect that profile to other profiles for the purposes of making an explicit personal network. Examples of such sites include Facebook and MySpace (Lenhart & Madden, 2007). The explosive growth in these sites has raised concerns among parents, school officials, and government leaders about the potential risks posed to young people when personal information is made available in such a public site. A telephone survey was conducted among a sample of 935 youths ages 12-17 and asked about the ways that teenagers used these sites and their reasons for doing so. Over half of the respondents had created a personal profile online and had used social networking sites like Facebook and MySpace. Over two-thirds had limited the access to their profiles. Nearly one half visits their site daily. Social networking teens used their sites to stay in touch with friends, to plan activities, and to make new friends. The Pew Internet Project survey had a margin of error in the overall sample of plus or minus three percentage points. MySpace was used more predominantly than Facebook by this age group, however, it had looser age restrictions and profiling regulations. Older teens tended to use more Facebook networking sites which, even though open to users

not affiliated with schools or colleges, students still had a real-world physical community – college campuses, high schools, employers and geographic regions. This report of college bound high school students should alert colleges and universities to the fact that technology, especially social technology, is going to be around for a while.

Information technology

While the literature is abundant on the social aspects of technology, including the Internet, social networking sites, and cell phone usage, there is much less literature of Windows based application programs in the software market, with what seemed to be an increase in the need to select employees with high levels of Window-based computer expertise. Along with this need arises the additional need to measure expertise to support human computer interaction research (Miller, Stanney, & Wooten, 1997).

Computer literacy can be defined as the understanding of computer characteristics, capabilities, and applications and the ability to implement this knowledge in the skillful, productive use of computer applications according to Miller, et al. (1997). Having unsuccessfully attempted to locate a computer literacy questionnaire for a system specific computer technology, and in spite of the widespread use of Windows-based applications, the authors developed a Windows computer experience questionnaire that required little administration time, determined the reliability of the questionnaire, and determined the sub-factors measured by the questionnaire.

Eighty-two students, with a mean age of 26.07 years, and varying levels of computer experience participated in the study. The questionnaire was developed with 14 Windows-based related questions and was administered to the participants. Preliminary internal consistency analyses were conducted for reliability. One question was dropped

resulting in 13 remaining questions, which were factor analyzed using SPSS. In administering the test, the questionnaire met the first objective of the study, which was to be easy to understand and quick to administer. The results showed that the questionnaire had internal consistency and was a reliable instrument for measuring Windows-based computer experience. The sub-factors included general Windows experience, advanced Windows experience, and formal instruction, which were related to the quantification of computer experience.

Aptitude and Attitude Toward Technology

Aptitude

A study by Bracey (1988) showed that students' anxiety over using computers has a negative effect on computer aptitude. The participants of the study were college students in a large urban university enrolled in a computer information systems course. The tests that were administered were the Computer Anxiety Scale and the Computer Aptitude Literacy and Interest Profile (CALIP) that produces a Computer Aptitude Quotient, and the Math Anxiety Rating Scale. The number of courses students had taken where they had used computers measured computer experience. The results as measured by correlation analysis indicated that computer anxiety was highly related to computer aptitude in a negative way; the higher the computer anxiety, the lower the aptitude.

Identifying variables that predict computer aptitude can help educators and employers target potential students and employees. A 100-question survey was administered to all the students of a required, entry-level business computer class at the University of Nevada, Reno. Six outcome variables were used as measures of computer proficiency: homework, four exam scores, and a final. Two measures of cognition were

used: Myers-Briggs type indicator and a 14 question problem-solving test. Six stepwise multiple regressions were performed to analyze the data.

Four observations were drawn from the results: (1) the models used were useful tools for helping advisors and employers evaluate computer aptitudes; (2) few of the demographic, academic, prior computer exposure, or behavioral variables were strong predictors of class performance; (3) cognitive factors emerged as important explanatory variables supporting the claim that underlying reasoning abilities could be as important as demographic variables, behavioral factors, mathematical abilities, or prior computer exposure in predicting computer proficiency; and (4) all four variables – demographic, behavioral, cognitive, and problem solving might be useful in forecasting computer aptitude.

In an effort to learn more about students' computer literacy levels and attitudes about computer use, a study was performed to evaluate the computer literacy of first-year students entering the University of Wisconsin-Eau Claire (Larson & Smith, 1994). A survey questionnaire was distributed through student orientation packets to the university's 2000 incoming first year students, with 444 students responding. The questionnaire asked students to record the amount and type of previous computer experience, the source of experience and their attitudes toward using computers. Demographic data including age, gender and major also were collected. Data analysis was performed to calculate frequencies for each question with cross tabulation on experience, age, major and gender with computer attitude questions in an effort to understand factors influencing both student computer literacy levels and students' attitudes toward using computers when they entered college.

Results of the study indicated the majority of students surveyed had some degree of computer literacy when they entered the university. When students were asked to assess their computer literacy with more specific skills, such as graphic, desktop publishing and spreadsheet programs, their literacy declined sharply. Nearly all students listed high school as the source of their computer experience. Cross tabulating survey data collected about students' level of computer literacy with responses to attitude questions revealed that increased experience was not equated with higher confidence levels. Computer literacy did not positively improve students' attitudes toward using computers. Intended major appeared to play no significant role in shaping student attitudes toward computer technology. Gender differences were found to be a factor in students' attitudes toward computers.

To determine if new freshmen college students were computer literate, a study was conducted by Creighton, Kilcoyne, Tarver, and Wright (2006) at Northwestern State University in two sections of an entry level computer course. The 96 students in each of the two sections were randomly selected and put into four different groups of 24 students each. Groups A and B were assigned to study the microcomputer software applications of Microsoft Word, Excel, and PowerPoint in the computer lab. Groups C and D remained in the lecture classroom where lectures on a variety of subjects such as computer systems, computer hardware, terminology definitions, and communication were taught. At the end of the first eight weeks, the 48 students in the lecture classroom swapped with the 48 students in the computer lab. Students in both classes completed a two-part exam; an objective test given to the lecture portion of the class and a performance-based production test given to those assigned to the computer labs. Data

were analyzed using descriptive statistics, t-tests, and Spearman's rho. From the results of the study, it appeared that students were computer literate in word processing, Internet, and e-mail skills but lacked general technology literacy and spreadsheet application skills.

Smith and Necessary (1996) investigated college students' computer literacy levels and their attitudes toward computers based on specific demographic variables such as gender, age, computer experience, overall knowledge of computers, computer ownership, and weekly computer usage. The participants of the study were 316 undergraduate college students enrolled in business courses at a large Midwestern university. The study used Kay's (1993) Computing Ability Scale (CAS) a 22 item Likert-type instrument with three subscales: Software Knowledge/Awareness; Programming Knowledge; and Perceived Control. In addition, demographic and computer related variables were also assessed including gender, age, number years computer experience, hours per week of computer use, overall knowledge of computers and personal computer ownership. Multiple one-way analysis of variance (ANOVA) procedures were used to determine where specific interaction effects existed among the independent variables studied. The results of the research revealed that experience with computers led to higher CAS scores. Non-traditional students scored significantly better on the CAS than their younger counterparts. There were significant effects for gender, however the interaction between gender and computer experience suggested that females may score lower on literacy due to their lack of experience. Demographic differences were also implied through this study.

The major purpose of a study by Geissler and Horridge (1993) was to identify university students' current level of knowledge of and commitment to computer technology and computer application. Undergraduate students enrolled at a major university in the Southwest participated in the study. The instrument used was a one – page, two-sided questionnaire with two sections consisting of demographic questions and a commitment scale. A total of 860 students completed the questionnaire. Data collected were analyzed by frequency and percentage distributions. The ANOVA procedure was used to determine if there were significant differences in current knowledge and commitment with respect to eight independent variables: college, year in college, grade point average, age, gender, high school computer class, university computer class, and computer ownership. Tukey HSD procedure was used to identify means that were significantly different.

Computer familiarity and use indicated a higher level of current knowledge and commitment to learning more about computers. Those students who had taken a high school computer course self reported a significantly different level of current knowledge and commitment than that reported by students who had not taken a high school computer course. Students who owned a personal computer rated themselves at significantly different levels in all competency areas in both current knowledge and commitment than those students who did not own a personal computer. The age of an individual was related to significant areas of differences, although due to the disproportionate numbers of students in the various age groups generalizations could not be made. With regard to college major, differences were found only in levels of current knowledge in some areas and all students had similar levels of commitment. The year in

college in which a student was classified revealed only two areas of significant difference: (1) seniors reported higher levels of current knowledge than freshmen or sophomores; and (2) freshmen reported higher levels of computer program knowledge than all other levels. Cumulative grade point was the least significant of all independent variables.

A study to assess students' use of computers, their access to microcomputers, and their opinions on possible computer course and ownership requirements was conducted using a telephone survey by McAulay (1993) at the University of Massachusetts. Interviews were obtained from 585 students. The survey suggested that the majority of undergraduates were aware of the increase of computer use within the job market. In addition, students recognized the need to become computer literate. As a result, undergraduates increased their use of personal computers and favored a mandatory computer course to become better prepared for the technology they will face in the future.

A study by Karsten and Roth (1998) focused on identifying relationships that existed among computer experience, computer self-efficacy, and computer-dependent performance in an introductory computer literacy course. Research participants consisted of 98 undergraduate students enrolled in a required introduction to information systems course at a university in the Midwestern United States. An initial questionnaire was administered the first day of class prior to any computer training and collected standard demographic data as well as three separate measures of self-reported computer experience that had been associated with computer literacy in prior research: total years of computer experience; current average hours per week of computer use; and the number of prior computer courses completed. Student perceptions were collected through the 35

item, 5 point Likert-type Computer Self-Efficacy (CSE) scale that was slightly modified to include skills associated with working in a networked environment. The CSE was administered again on the last day of class along with an objective performance measure for the course based on homework assignments throughout the semester. Basic correlation analysis (Pearson *r*) and multiple regression were used to determine the significance and direction of the relationships among the study variables. A *t*-test analysis was used to detect changes in pre-course and post-course measures of computer self-efficacy. Study findings suggested that although a wide variety of computer experiences enhanced the student perceptions of their computer competencies, only those experiences that developed or enhanced the specific computer skills defined to comprise computer literacy in a particular context were likely to have an impact on computer-dependent course performance. The relevance of prior computer experience seemed to matter more than its quantity. A significant relationship was found between student perceptions of computer literacy and course performance, although not strong. These results offered support for continuing a basic training approach in college courses designed to develop and enhance student computer literacy.

Attitude

Understanding why people accept or reject information technology has proven to be one of the most important and challenging issues in information system research. In order to discover individual affective, cognitive, and behavioral attitudes toward computer and Web technologies, Liaw, (2002) conducted a study with three purposes: (1) to examine the relationship between computer attitudes and Web attitudes; (2) to find the predictor variables on computer attitudes and Web attitudes; (3) and to discuss the

differences of demographic factors on computer attitudes and Web attitudes. The data for the study was gathered by a questionnaire survey with four major components: (1) demographic information; (2) computer experience; (3) Computer Attitude Scale (CAS); and (4) Web Attitude Scale (WAS). The participants were students who studied in Seattle Pacific University and were chosen by a university web page search for student email accounts. The method of selection was to use first names as key words for searching. Fifty-eight names were used in this study for selecting samples and 809 participants were chosen. The participants returned their perceptions by a survey Web page via the Internet with a total of 260 usable respondents.

Correlation analysis of the relationship between the CAS and the WAS indicated that there was a high correlation between the perception of computer and Web attitudes. A stepwise regression analysis was performed to check the effect of the variables of computer experience on the CAS and showed that individual experience using computers, years of computer-related experience, and experience with word processors were three predictors on the CAS. Experience with word processors and experience using the Internet were the two predictors on the WAS. Analysis of the demographic differences resulted in three significant differences on the CAS and the WAS, including gender, college major, and years of computer related experience. An independent samples *t*-test was conducted on the analysis of gender difference with results showing that male students had more positive attitudes toward computers and the Web than female students. A one-way multivariate analysis of variance (ANOVA) was conducted to determine the effect of college major on the two variables, CAS and WAS. The students who majored in science and engineering had more positive attitudes toward the CAS and the WAS than

the students who majored in social and behavioral sciences, but the result was not significant. MANOVA was conducted for examining differences of years of computer-related experience and indicated a significant difference among years of experience and the CAS and WAS. This study indicated that students who already used computers six or more years had the most positive feeling toward computers and the Web.

A study by Robertson and Stanforth (1999) investigated the interest level of undergraduate students enrolling in Web-based courses as well as their computer skills and attitudes. A questionnaire utilizing the Computer Attitude Scale (CAS) was given to 205 Family and Consumer Sciences majors at two Midwestern, land-grant universities. Analysis of variance was used to examine the relationship between self-reported computer skills and computer attitude sub-scales. The findings of the study indicated that students report a relatively high level of computer skills, but do not have good attitudes toward computers and feel anxious about using computers.

Research studies have established that psychological attitudes such as independence, creativity, tough-mindedness, sociability, risk-taking, stimulus- and sensation-seeking are key attitudes connected with effective information and communication technology (ICT) use. The aim of a study by Katz (2002) was to examine whether these psychological attitudes affect students' attitudes to distance learning at the post-secondary level. The research consisted of 67 first year students who were registered in the School of Education at Safed Regional College in Israel. The instrument was a research questionnaire designed to examine satisfaction, independence, level of control and study motivation of students and was administered to two randomly divided groups of students at the end of the second academic semester. The first group

was taught by a senior lecturer using the video-conferencing system and the same instructor instructed the second group using the Internet approach. The synchronous lectures were performed online and the Internet lectures were downloaded from the university website. Means and standard deviations were run on the data with Discriminate Function Analysis computed to evaluate the contribution of each attitude to students' utilization preferences of the two distance learning approaches. The findings confirmed the existence of a significant relationship between certain psychological attitudes of students at the college level. Results indicated that the interactive synchronous video-conferencing approach was preferred by students and significantly characterized by student satisfaction with learning, students feeling of greater control of the learning process, and motivation to study. The Internet-type distance learning approach was preferred by students who wanted more independence in the learning process. The conclusion was that a distance learning system that was highly interactive and most closely resembled a regular college lecture hall was preferred by students with certain learning preferences and attitudes. Students who were more independent in their learning approach preferred a less interactive Internet-type of distance learning approach.

Technology continues to change and grow and those who are technologically advanced will have an advantage over those who are not. The focus of a recent study by Morahan-Martin and Schumacher (2007) had three purposes: (1) to delineate the skills that indicated technological expertise; (2) to assess whether there are differences in technological expertise by gender and computer ownership; and (3) to identify demographic, experiential, and attitudinal factors which predicted technological expertise. A survey that included Internet and computer experience, skills and attitudes

was given to 258 incoming university students in the United States. The questionnaire included sections assessing demographics, reasons for Internet and computer use, Internet and computer skills and expertise, and Internet and computer behaviors and attitudes. A two-way ANOVA with interaction was used to determine if technological expertise was related to gender or computer ownership. Factor analysis was used to reduce the number of questions relating to skills, experience and attitude questions. The factors from the Factor Analysis along with the gender and computer and Internet use questions were used as independent variables in a General Linear Model to identify which of these variables were significant predictors of technological expertise.

This study showed factors associated with computer and Internet expertise in a select population. The skills identified indicators of more technological sophistication such as creating a Web page, customizing a Web Page, listening to Web radio, changing cookie preferences, writing computer programs, and using desktop publishing. The first four were also indicators of online expertise. Gender differences were found in technological sophistication. Males used twice as many cutting edge applications than females suggesting that there was still evidence of a gender gap. Those who owned their own computers in this study were more likely to have used more cutting edge technologies then those who did not. The results of the GLM found that 41% of the variance for technological expertise was explained by the predictors. Significant predictors included Internet skills, Internet and computer abuse, computer/math skills, weekly Internet use, gender, and Internet and computer comfort/competency. Internet and computer abuse and overuse were strong predictors of technological expertise as well.

A study by Necessary & Parish (1996) was conducted to help determine if those individuals who voluntarily used computers demonstrated more favorable attitudes toward computers than their non-voluntary counterparts, and /or if those individuals who owned or had owned a computer demonstrated more favorable attitudes than their non-owner counterparts. A total of 164 undergraduate students enrolled in a computer literacy class at a large Midwestern university completed the three subtests of anxiety, confidence, and liking of the Likert-type Computer Attitude Scale. A series of analysis of covariance was used to examine the data.

Results of the computer anxiety subset found those who voluntarily used a computer were significantly less likely to experience computer anxiety than those who had not and those who owned or had owned a computer were less likely to experience anxiety than those who had not. Females were found to demonstrate more computer confidence than males, those who voluntarily used a computer were more confident, and those who owned or had owned a computer were less likely to experience anxiety than those who had not. Those who were younger were found to be more inclined to like computers than those who were older; females were also found to demonstrate more computer liking than males; those who had voluntarily used computers were more inclined to like computers and those who owned or had owned a computer were more likely to demonstrate computer liking than those who had not. The theory of cognitive dissonance was strongly supported by this study of computer attitudes with the findings suggesting that computer users and owners have made a personal commitment to their computers and therefore adjusted their attitudes accordingly.

A study to measure computer attitude differences between underclassmen and graduating seniors was conducted by Walters and Necessary (1996) using the 24 item Attitude Toward Computer Scale (ATCS). The sample consisted of 204 business students at a large Midwestern university who were divided into two groups: (1) 103 underclassmen and (2) 101 graduating seniors. Analysis of variance tests comparing underclassmen versus seniors' attitudes toward computers were conducted on the data. The study found that ATCS scores for university students were related to the number of university computer courses completed, years of computer experience, overall computer knowledge, and ownership of a personal computer. No significant differences were found with respect to gender.

Necessary and Parish (1996) conducted a study to determine whether having more computer experience was actually related to: (1) less computer anxiety; (2) more computer confidence; (3) greater computer knowledge; and (4) a better liking of computers. Each of the variables cited were correlated with other variables including amount of computer experience as well as average number of hours of computer usage per week in order to determine how they are related to each other. A total of 157 undergraduate students in a required computer literacy class at a large Midwestern university volunteered to participate in the study. All participants completed the Computer Attitude Scale developed by Loyd and Gressard (1984), a 30-item Likert-type instrument that assessed attitudes toward computers and computer usage. A series of Pearson product-moment correlations were performed on these data. Results of the study indicated increased levels of computer experience and balance of weekly computer usage

were related with reduced levels of computer-related anxiety, enhanced computer confidence, greater computer knowledge and increased liking for the computer.

Summary of Major Points

The review of literature in this chapter was divided into six major sections: (1) technology in higher education; (2) technology in apparel merchandising and design programs; (3) how college students use technology; (4) technology as a personality variable; (5) aptitude and attitude toward technology; and (6) a summary of major points.

Literature suggests that a positive relationship exits between the experience levels with computers and favorable attitudes toward computers. College students with little or no experience with computers have more anxiety when required to take a literacy course than those students who have had previous computer experience. To be competitive in nearly any business or profession today computer literacy is likely to be one of the essential keys to finding success (Necessary, & Parish, 1996).

College students have changed throughout the course of higher education history. Labels have been given to each generation in the 20th century identifying that group with the demographics of the time (Zis, 2002). For the purposes of this research, the generations known as the Net Generation and the Millennials are being reviewed. The Net Generation consists primarily of those people born between 1977 and 1997 (Napoli & Ewing, 2001). Also known as the digital revolution, this generation of people is technologically sophisticated and represent a powerful group of consumers. The generation known as the Millennials was born in 1982 to the present. They take technology for granted, having grown up with it (Murray, 1997). Few studies have been

done on this Millennial generation to determine just how much of that technology they truly understand and can use.

The ultimate goal of computer implementation in education is to ensure effective utilization of computer applications by the entire student population (Levine & Donitsa-Schmidt, 1997). There are individuals that are not computer literate and are intimidated by the utilization of computers. They can learn to use computers but usually they do not feel comfortable and that fact alone impacts their learning experience (Jacoby, 2005).

Curriculum designers in post-secondary education seem to have abandoned the debate over whether computers should be used in the classroom and have turned their focus on the questions of when and how computers can be used effectively (Loyd & Gressard, 1984). An assessment of students' computer literacy and attitudes would help educators in curriculum planning and in developing strategies to incorporate computer use successfully into various instructional classes using computers as part of their instructional methodology. Identifying the existing computer literacy of undergraduate students will help teachers effectively plan curricula that would strike a balance between computer training and content instruction. Although computer software used by students in many colleges is fairly simple and easy to use, students still spend a significant portion of class time mastering software. Computer technology could interfere with or detract from students' ability to focus on course content or move on to more challenging, career specific software. (Larson & Smith, 1994).

Research has shown that while students are proficient in word processing and e-mail, their general knowledge about computers and technology as well as their spreadsheet knowledge fall short of what is expected in college (Creighton, Kilcoyne,

Tarver, & Wright, 2006). For students and business people alike, exposure to computers is nearly unavoidable. Computers play a key role in business and the question of what constitutes computer literacy is more crucial than ever. To use computers in applied settings, students need to master at least some level of computer literacy. This could be hampered by a degree of computer anxiety. Studies have suggested that computer experience is positively related to attitudes and interest in computers. Further studies have investigated the impact of demographic variables of gender, age, and computer experience (Smith & Necessary, 1996).

It has been shown through research studies that certain factors such as age, sex, previous computer experience and time in contact with a computer influence learning to use a computer. Results of previous studies indicate that having taken a high school or university computer class or owning a computer strongly influences a student's self-perceived level of current knowledge about computers and the student's commitment to learning more about them. Variables such as college, year in college, grade point average, age and gender have varying amounts of influence on the self-reported levels of current knowledge and commitment suggesting that students should be encouraged or required to enroll in high school and university computer classes and to own a computer if they are to increase their level of computer literacy and become more competitive in school and after graduation (Geissler & Horridge, 1993).

While the review of literature found substantial work focusing on computer technology and its use, little research has been done on computer technology and social technology and the impact on college students. Students arrive on college campuses knowing how to use a computer or use technology for a number of purposes, but those

purposes are not necessarily the ones that will make the students successful. They can chat online with their friends, download MP3 files, or engage in instant messaging, but they lack the proficiency in using computer software as well as information-processing skills that are important in college and many careers (Young, 2004). Multiple studies have been conducted measuring computer technology in various aspects, including computer anxiety, digital divide, ethnicity, Internet addiction, age, gender and even social technology risks, but none have measured attitudes and aptitude of social technology skills and technical technology skills of today's undergraduate student. By measuring the attitude and aptitude of college undergraduates, assessing their social and technical skills in computer technology with reference to their age, gender, ethnicity, class standing, and academic major, implications for future instructional methods as well as vocational decisions can be made.

CHAPTER III

Methods

General Introduction and Purpose

The purpose for conducting the study was to explore college student's perceived capability regarding specific technical technology skills and knowledge. Specifically, the study explored the perceived aptitude and attitudes of university students majoring in apparel merchandising and design as well as other related and non-related majors toward social and technical computer technology. The study referenced demographic variables of age, gender, ethnicity, class standing, and academic major to determine if differences might have occurred due to demographics.

Organization of Methods

The methods chapter was divided into six major sections: (1) Sample; (2) Design; (3) Instrumentation; (4) Collection of Data; (5) Data Analysis; and (6) Chapter Summary. Variables reviewed in this chapter include perceived (1) aptitude and (2) attitudes of college undergraduates in apparel merchandising and design and related and non-related majors toward dependent variables of (A) social and (B) technical computer technology. Independent variables considered included (a) age, (b) gender, (c) ethnicity, (d) class standing, and (e) academic major. A review of computer attitude and computer aptitude measurement scales was discussed along with the design of the study. The collection of data methods was specifically addressed as well as the data analysis to be conducted.

Sample

Sampling is the selection of units, or participants, for a study following a designated set of rules, to make inferences about a defined population without having to

interview the entire population (Czaja & Blair, 2005). Nearly every survey uses some type of sampling primarily for economical reasons (Alreck & Settle 1985). Surveying every individual in a population is usually too expensive and the population too large to manage in terms of time and personnel. To avoid bias or error in the results, the survey must be reliable and valid. Reliability refers to freedom from random error while validity is the degree that the survey measures what it is designed to measure (Alreck & Settle, 1985). The difference between the sample data and the population data is known as sampling error. The higher the sampling error and the smaller the sample, the lower the reliability of the data. The most reliable sample for a survey is a random or probability sample, where the probability of any one person being selected is representative of the entire population. Each person of the population is listed in a sampling frame and members of the sample are pulled from this list. If there is no sampling frame available for the entire population, then non-random or non-probability sampling can be used (De Vaus, 1986). Purposive sampling is a form of non-probability sampling where a typical representation of the population is selected in the absence of a clearly defined sampling frame or population, reflecting individuals who are chosen from a representative group of the population (De Vaus, 1986).

The study used non-probability, purposive sampling techniques to obtain a sample from which data was collected. The participants for the investigation were college undergraduate apparel merchandising and design students and students from other related and non-related majors. Students enrolled in Apparel Studies, Nutrition, Hospitality, Family Relations, Interior Design, Agricultural Mechanization, Agricultural Education, Communication, Principles of Biology, Freshman Business Connection, Markets and

Consumers, Enterprise Resource Planning Fundamentals, and Enterprise Resource Planning Configurations and Implementation classes at the University of Arkansas were asked to complete the survey instrument during class time. Participation was voluntary with no incentive given.

There were a total of 1270 students responding to the survey with 1052 usable surveys remaining after cleaning the data for missing entries. This constituted an 83% response rate. The sample size exceeded the maximum practical sample size of 1,000 according to Alreck and Settle (1985), which helped to ensure the reliability and validity of the sample. Table 1 shows the number of students participating in the study according to the classes surveyed in each department.

Table 1.

Number of students participating in the study

Department	Number of Students
Apparel Studies Classes	173
Other Human Environmental Sciences Classes	349
College of Agricultural, Food, and Life Sciences (minus HESC/APST)	69
Walton College of Business	254
Fulbright College of Arts and Sciences	425
Total Surveys Collected:	1270
Total Surveys Included in Analysis:	1052
Response Rate:	83%

Design

Surveys are a method of social research design (Biemer & Lyberg, 2004; De Vaus, 1986). The survey method is not just a way of collecting data, according to Marsh (1982) but also of analyzing the results. Surveys are conducted to obtain information that

is unavailable from other sources or would be more difficult and expensive to obtain in another manner (Alreck & Settle, 1985; Jolliffe, 1986). A sample survey includes three methodological areas: sampling, designing questions, and interviewing (Fowler, 1988). More specifically, Czaja and Blair (2005) suggested five general stages in the development and completion of a survey: (1) survey design and preliminary planning; (2) pre-testing; (3) final survey design and planning; (4) data collection; (5) data coding, file construction, analysis and final report. Surveys can capture a wide variety of information on many diverse topics, including attitudes, aptitude, and demographics. Attitudes, which are the beliefs, feelings and actions of the individual, are the subject of many surveys (Alreck & Settle, 1985), and should reflect the goal of the research questions. The type of information collected from the respondent and how best to obtain that information are key elements of the design of the survey (Czaja & Blair, 2005). The Likert scale, named for its creator, states the issue or opinion and obtains the respondents' degree of agreement or disagreement to the statement, providing the answers in the form of coded numerical data that are comparable and measurable for data analysis (Alreck & Settle, 1985). This scaling technique is widely used due to the power and simplicity of the format as well as its flexibility, economy and ease of composition. A major advantage is the ability to obtain a summarized value by individual item and by a set of items. The total value would be an index of the responses to the major issue as a whole.

The research model selected for use in this study was the survey design method. The survey was designed to produce quantifiable statistics of the attitudes and perceived aptitudes toward social and technical computer technology. The responses were collected in a questionnaire format from undergraduates making up a representative sample of the

population. The responses constitute the data that was analyzed. The questions were stated in the instructions above the scale and respondents related their agreement or disagreement to each of the statements in the questionnaire. The statements were closed-ended with respondents choosing from a list of provided responses. The research questions posed in this study required the participant's opinion or attitude and their perception of their aptitude of social and technical technology. Demographics of age, gender, ethnicity, college level, and major were also collected through the questionnaire.

Instrumentation

Perceived aptitude and attitude toward social and technical computer technology was measured using a survey questionnaire with Likert-type statements of attitudes toward computers as well as perceptions of aptitude of computer technology. The survey was replicated from a combination of computer attitude and computer efficacy scales with slight modification to include perceived competency associated with social technology. Also included in the questionnaire was demographic information about the respondent.

The survey consisted of three distinct components: (1) attitude toward social and technical technology; (2) non-performance based, self-reported perception of aptitude toward social and technical technology; and (3) collection of demographic information from the students. Concrete facts such as laptop and desktop computers, MP3 players, iPods, cell phones, applications with common software such as word processing, spreadsheets, e-mail, and Internet browsers and web sites as well as more sophisticated tools for academic courseware, Web authoring, and graphic design made up the components of the aptitude portion of the survey. The technologies were presented in a

randomly ordered list and the students responded to each item on the list using a 5-point Likert-type scale (1=very low, 2=low, 3=average, 4=high, 5=very high) that assessed perceived knowledge in using computers or software. Positively and negatively worded statements were included in the survey and were recoded prior to analysis.

Student attitude toward social and technical technology was measured using a modified computer attitude scale, which assessed students' attitudes toward computers. A 5-point Likert-type scale (1=do not agree, 2=slightly disagree, 3=neither disagree or agree, 4=slightly agree, and 5=agree) was used to rate the student's attitude towards computers and technology use. Students responded to a demographic data survey for information regarding age, gender, ethnicity, class standing, and academic major.

Measurement Scales

The specific questions for the attitude component of the questionnaire were adapted from The Computer Attitude Scale (CAS) developed by Loyd and Gessler (1984). The CAS is a Likert-type instrument consisting of 30 questions, which present statements of attitudes toward computers and the use of computers. Three main types of attitudes are represented in the questions: (1) anxiety or fear of computers; (2) liking of computers or enjoyment working with computers; (3) confidence in ability to use or learn about computers. In a study examining the reliability and factorial validity of the CAS and its three subscales, the data suggested that this instrument was an effective, reliable and convenient means of measuring student attitudes toward learning about and using computers, scoring a coefficient alpha reliability for the total test of .95 (Loyd & Gessler, 1984).

Harrison and Rainier (1992) conducted a study to examine the factor structures and validity of the Computer Self-Efficacy Scale (CSE) developed by Murphy, Coover and Owen (1989). The CSE is a 32 item, self-reporting computer self-efficacy scale which measures perceptions of students' capabilities regarding specific computer-related knowledge and skills, moderate computer skills, and advanced computer skills. The 1992 study by Harrison and Rainier found reliability coefficients for each component of the CSE: (1) CSE1 beginning skill = .97; (2) CSE2 moderate skill = .95; (3) CSE3 advanced skill = .98.

The final survey used for the study was a modification of the CSE and CAS measurement scales. The survey included additional modified statements of social technology skills and attitudes regarding laptop and desktop computers, MP3 players, iPods, cell phones, applications with common software such as word processing, spreadsheets, e-mail, and Internet browsers and web sites as well as more sophisticated tools for academic courseware, Web authoring, and graphic design. (See Appendix A.)

Collection of Data

The four most common survey approaches are by mail, telephone, face-to-face, and the Internet (Czaja & Blair, 2005). The study utilized a face-to-face data collection method. The survey instrument was hand administered to the selected classes. Students attending the class on the day of the survey were asked to complete a questionnaire, recording their responses on a Pearson NCS scan form. Due to the large sample size of the study and the proximity of the classrooms for coordination with the instructors for the best time to conduct the survey, no sub-sample of absent students was conducted. Data

collection was conducted beginning in late October through early December, 2007 as arranged through the class instructors.

Data Analysis

Descriptive statistics involves tabulating and describing sets of data (Glass & Hopkins, 1996) and includes measures of central tendencies (means, median, mode), proportions (percentages), and measures of variation (standard deviations and sampling error). The mean (X) is the average of a set of numbers; that is the sum (Σ) divided by the number (n) of observations. Large quantities of data must be organized and summarized before they can be analyzed. Descriptive statistics serve as a tool for describing and summarizing and reducing to a manageable form the properties of a large data set.

The independent samples t-test is used to compare means when there are two experimental conditions and different groups of participants (Field, 2005). The t-test is limited to situations in which there are only two levels of the independent variable. The statistical technique known as the analysis of variance (ANOVA) is used to compare means when there are three, four or five levels of the independent variable. In these situations, ANOVA can be used to determine how these independent variables interact with each other, what effects these interactions have on the dependent variable and whether the differences among the means are greater than would be expected from sampling error alone. If there are three or more levels of any factor associated with a significant main effect, multiple comparison procedures are required to determine which of the sample means show differences large enough to permit conclusion that the associated population means differ. Independent t-tests are less likely to produce

experimental errors when comparing only two levels of independent variables. When the number of independent variable levels increases to three, four or five, the probability of experimental error also increases. The ANOVA statistic will test three or more means without having to conduct multiple *t*-tests and chancing experimental error.

Measures of correlation are used to describe the relationship between two variables (Field, 2005). The Pearson correlation coefficient quantifies the magnitude and direction of the linear relationship between two variables. The correlation coefficient is the ratio of how far from the mean of Y (the predicted variable) tends to be relative to how far they are from the mean of X (the predictor) when the differences are expressed in standard deviation units. The strength of the relationship between two variables is measured with the correlation *r* statistic. When $r = 1$ the effect is perfect or high. When $r = 0$ there is no effect. Correlation is the objective measure of the importance of the effect.

The reliability coefficient of a measure can be viewed as that proportion of its variance that is not error (Glass & Hopkins, 1996). A measure must have some reliability if it is to have validity. It is good practice to estimate and report reliability coefficients for the outcome measures. Cronbach's alpha reliability coefficient describes the degree to which scores on a measure represent something other than measurement error. If two sets of parallel measures agree perfectly, the reliability of the measure is 1.00. It has been demonstrated that reliability estimated by Cronbach's alpha coefficient is a good estimate of parallel form reliability.

Once students completed the attitude and aptitude survey, reliability was tested using Cronbach's reliability coefficient with .7 or higher as the standard of measurement.

Descriptive statistics of frequency and percentage distributions were applied to the data using means, median, percentages, and standard deviations for all questions including demographics of age, gender, ethnicity, class standing and academic standing. Individual and group means were compared using independent samples *t*-tests for the two level variables of gender and ethnicity and one-way independent analysis of variance (ANOVA) tests for the multi-level variables of age, academic major and class standing. Correlation tests were used to determine student tendency toward social or technical computer skills. Four major research questions were addressed in this study with data analysis conducted on each question.

Research Question One: What was the (1) perceived aptitude of college students toward the dependent variables of (A) social and (B) technical computer technology based upon the independent variables of (a) age, (b) gender, (c) ethnicity, (d) class standing, and (e) academic major? Technical aptitude data were collected from survey questions three through 23 and 36 through 42. Social aptitude data were collected from survey questions 24 through 35 and 43 through 46. Demographic data were collected from survey questions 100 through 105. Reliability was tested using Cronbach's reliability coefficient with .7 or higher as the standard of measurement. Frequency and percentage distributions were applied to the data using means, percentages, and standard deviations for all social aptitude, technical aptitude, and demographic questions. Group means were assessed using independent *t*-tests for gender and ethnicity and one-way analysis of variance (ANOVA) for age, academic major and class standing to understand factors influencing perceived student social and technical computer aptitude.

Research Question Two: What was the (1) attitude of college students toward the dependent variables of (A) social and (B) technical computer technology based upon the independent variables of (a) age, (b) gender, (c) ethnicity, (d) class standing, and (e) academic major? Technical attitude data were collected from survey questions 47 through 76. Social attitude data were collected from survey questions 77 through 99. Demographic data were collected from survey questions 100 through 105. Reliability was tested using Cronbach's reliability coefficient with .7 or higher as the standard of measurement. Frequency and percentage distributions were applied to the data using means, percentages, and standard deviations for all social attitude, technical attitude, and demographic questions. Group means were assessed using independent *t*-tests for gender and ethnicity and one-way analysis of variance (ANOVA) for age, academic major and class standing to understand factors influencing perceived student social and technical computer attitude.

Research Question Three: Were there significant differences between social technology and technical technology perceptions of competency in college students? The one-way ANOVA and independent *t*-tests were used to determine significance in all levels of variables. Significance was assessed using Tukey's HSD post hoc test to compare all groups of participants with each other where there were four or more levels of independent variables in the one-way ANOVA tests.

Research Question Four: What was the correlation between perceived social aptitude, technical aptitude, social attitude and technical attitudes of college students? Pearson product correlation coefficients measured the relationship between the attitude (CAS) and perceived aptitude (CSE) and social and technical skills using data from

survey questions three through 105. Basic correlation analysis was used to determine the significance and strength of the effect of the relationships among the study variables.

Chapter Summary

The purpose of this study was to investigate college students' technical and social technology competencies based upon their attitudes toward computers and their perception of technical computer knowledge. Non-probability, purposive sampling techniques were used in the study to obtain a sample from which data was collected. The participants for this investigation were college undergraduates majoring in apparel merchandising and design and other related and non-related majors at the University of Arkansas.

The research model selected for use in this study was the survey design method. The survey was designed to produce quantifiable statistics of the attitudes and perceived aptitudes of students toward social and technical computer technology. The attitude component of the questionnaire was adapted from the Computer Attitude Scale (CAS) developed by Loyd and Gessler (1984). The Computer Self-Efficacy Scale (CSE) developed by Murphy, Coover and Owen (1989) measured perceptions of students' capabilities regarding specific computer-related knowledge and skills, moderate computer skills, and advanced computer skills.

The responses were collected in a questionnaire format from undergraduates making up a representative sample of the population. The survey method was used to collect the data for the study through pre-selected classes of undergraduate students on the University of Arkansas campus. Descriptive statistics, percentages, frequencies, independent *t*-tests, analysis of variance, and correlations were used to analyze the data

with respect to age, gender, ethnicity, class standing, and academic major to determine student tendency toward social or technical computer skills.

CHAPTER IV

Results

Summary of the Study

Literature suggests that a positive relationship exists between the experience levels or aptitude with computers and favorable attitudes toward computers. College students with little or no experience with computers have more anxiety when required to take a computer literacy course than those students who have had previous computer experience (Necessary & Parish, 1996). According to Necessary and Parish (1996), to be competitive in business or other professions today computer literacy is likely to be one of the keys to finding success.

The ultimate goal of computer implementation in education is to ensure effective utilization of computer applications by the entire student population (Levine & Donitsa-Schmidt, 1997). There are individuals who are not computer literate and are intimidated by the utilization of computers. They can learn to use computers but usually they do not feel comfortable and that fact alone impacts their learning experience (Jacoby, 2005).

Curriculum designers in postsecondary education agree that computers should be used in the classroom, but now the focus is on the questions of when and how computers can be used effectively (Loyd & Gressard, 1984). An assessment of students' perceived computer literacy and attitudes would help educators plan better curriculum and develop strategies to incorporate computer use into various instructional classes, using computers as part of the instructional methods. Identifying the existing perceived computer literacy of undergraduate students will help instructors plan effective curricula that would balance computer training and content instruction. Although computer software used by students

in many colleges is fairly simple and easy to use, students still spend a significant portion of class time mastering software. Computer technology could interfere with or detract from students' ability to focus on course content or move on to more challenging, career specific software. (Larson & Smith, 1994).

Research has shown that while students are proficient in word processing and e-mail, their general knowledge about computers and technology as well as their spreadsheet knowledge falls short of what is expected in college (Creighton, Kilcoyne, Tarver, & Wright, 2006). For students and business people alike, exposure to computers is nearly unavoidable. Computers play a key role in business and the question of what constitutes computer literacy is more crucial than ever. To use computers in applied settings, students need to master at least some level of computer literacy. This could be hampered by a number of factors, including computer anxiety.

Studies have suggested that computer experience is positively related to attitudes and interest in computers (Walters & Necessary, 1996; Necessary and Parish, 1996). Further studies have investigated the impact of demographic variables of gender, age, and computer experience (Smith & Necessary, 1996). It has been shown through this research that certain factors such as age, gender, previous computer experience, and time in contact with a computer influence learning to use a computer. Results of these studies also indicate that having taken a high school or university computer class or owning a computer strongly influences a student's self-perceived level of current knowledge about computers and the student's commitment to learning more about them. Variables such as college, year in college, grade point average, age and gender have varying amounts of influence on the self-reported levels of current knowledge and commitment suggesting

that students should be encouraged or required to enroll in high school and university computer classes and to own a computer if they are to increase their level of computer literacy and become more competitive in school and after graduation (Geissler & Horridge, 1993).

There is substantial work focusing on computer technology and its use, however little research has been conducted on technical computer technology and social computer technology and their impact on college students. Students arrive on college campuses knowing how to use a computer or use technology for a number of purposes, but those purposes are not necessarily the ones that will help make the students successful. They can chat online with their friends, download MP3 files, or engage in instant messaging, but they lack the proficiency in using computer software as well as information-processing skills that are important in college and many careers (Young, 2004). Multiple studies have been conducted measuring computer technology in various aspects, including computer anxiety, digital divide, ethnicity, Internet addiction, age, gender and even social technology risks, but none have measured perceived attitudes and aptitude of social technology skills and technical technology skills of undergraduate college students. By measuring these perceptions of attitude and aptitude of college undergraduates and assessing their social and technical skills in computer technology with reference to their age, gender, ethnicity, class standing, and academic major, implications for future instructional methods as well as vocational decisions could be made.

Purpose of the Study

The purpose for conducting the study was to explore college student's perceived capability regarding specific technical technology skills and knowledge. Specifically, the

study explored the perceived aptitude and attitudes of undergraduate university students majoring in apparel merchandising and design as well as other related and non-related majors toward social and technical computer technology. The study referenced demographic variables of age, gender, ethnicity, class standing, and academic major to determine if differences might occur due to demographics.

Perceptions of aptitude and attitude toward social and technical computer technology were measured by using a modification of an existing computer self-efficacy survey and a computer attitude scale to include the tendencies toward social as well as technical technology. The participants for the investigation were University of Arkansas undergraduate apparel merchandising and design students and students from other related and non-related majors. Once students completed the attitude and aptitude survey, one way analysis of variance (ANOVA), independent *t*-tests and correlations as well as frequency and percentage distributions were used to analyze the data with respect to age, gender, ethnicity, class standing, and academic major to determine student tendency toward social or technical computer skills. The results could help educators make better informed curriculum decisions regarding course content of computer courses in higher education as well as possibly impact the success rate of college graduates in their chosen vocations.

Significance of the Study

Technology has influenced and changed the Net Generation from previous generations and is now changing higher education (Oblinger & Oblinger, 2006). This study researched the tendencies of students toward social or technical computer competencies based upon specific demographic characteristics of age, gender, ethnicity,

class standing, and academic major with implications for accrediting bodies, higher education administration, faculty, students, and employers who could be affected by this generation's technological attitudes and aptitudes. Accrediting bodies can accurately assess the technological offerings of apparel merchandising and design programs with documented student competencies resulting from this study. Higher education administration and faculty could be impacted by this knowledge to develop and implement more meaningful curriculum in apparel merchandising and design programs. Employers could be more satisfied with the competencies and qualifications of apparel merchandising and design graduates. Students could benefit the most by receiving the needed technology exposure for successful academic and vocational careers.

Data Collection Results

Students enrolled in Apparel Studies, Nutrition, Hospitality, Family Relations, Interior Design, Agricultural Mechanization, Agricultural Education, Communication, Principles of Biology, Freshman Business Connection, Markets and Consumers, Enterprise Resource Planning Fundamentals, and Enterprise Resource Planning Configurations and Implementation classes at the University of Arkansas were asked to complete the survey instrument during class time. Participation was voluntary with no incentive given. The research model selected for use in this study was the survey design method. The survey was designed to produce quantifiable statistics of the attitudes and perceived aptitudes toward social and technical computer technology. The responses were collected in a questionnaire format from undergraduates making up a representative sample of the population. The responses constitute the data that were analyzed. The questions were stated in the instructions above the scale and respondents related their

agreement or disagreement to each of the statements in the questionnaire. The statements were closed-ended with respondents choosing from a list of provided responses. The research questions posed in this study required the participant's opinion or attitude and their perception of their aptitude of social and technical computer technology. Demographics of age, gender, ethnicity, college level, and academic major were also collected through the questionnaire. Perceived aptitude and attitude toward social and technical computer technology was measured using a survey questionnaire with Likert-type statements of attitudes toward computer technology as well as perceptions of aptitude of computer technology. The survey was replicated from a combination of computer attitude and computer efficacy scales with slight modifications to include perceived competency and attitude associated with social technology. Demographic data were also collected from the respondents in the survey instrument. Students responded to each item on the instrument using a 5-point Likert-type scale of 1=very low; 2=low; 3=average; 4=high; 5=very high for the aptitude portion of the survey and 1=do not agree, 2=slightly disagree, 3=neither disagree or agree, 4=slightly agree, and 5=agree for the attitude portion of the survey.

Prior to data analysis, positively and negatively worded statements included in the survey were recoded for analysis. The data were cleaned to remove all missing entries and a reliability test was performed on the items to determine instrument reliability.

Demographic data of age, gender, ethnicity, class and major were collected from the respondents and were statistically analyzed in the data analysis as independent variables. Demographic questions of age, class, and ethnicity were regrouped into fewer categories due to small numbers of students in some of the outlying categories. Age was

regrouped from five categories to four categories of 18-19, 20-21, 22-25, and 26 and older. Ethnicity was regrouped from five categories to two categories to include White and Nonwhite respondents. Class was regrouped from five categories to four categories, including Freshmen, Sophomores, Juniors, and Seniors for the statistical analysis omitting 16 missing entries. This difference is noted in the statistical analysis. Students listed in Table 1 by departmental classes were not necessarily departmental majors as shown in the majors category of Table 2. Table 2 shows the demographic characteristics of students participating in the survey.

Table 2.

Demographic profile of participating students

Demographic Characteristic	Frequency	Percent
Gender		
Female	712	67.7
Male	340	32.3
Ethnicity		
White	895	85.1
Non-White	157	14.9
Age		
18-19	503	47.8
20-21	347	33.0
22-25	146	13.9
25-older	56	5.3
Class		
Senior	191	18.2
Junior	237	22.5
Sophomore	266	25.3
Freshman	342	32.5
Other	16	1.5
Academic Major		
Agriculture	83	7.9
Apparel Studies	145	13.8
Arts and Sciences	187	17.8
Business	256	24.3
Other	381	36.2

Data Analysis

The internal consistency estimates for the instrument were computed for the entire survey using Cronbach's Alpha ($\alpha = .89$) and for the subscales of technical

attitude/aptitude (α = .85) and social attitude/aptitude (α = .74). Using .7 or higher as the standard of measurement, the instrument was considered reliable for the data collected.

Individual and group means were compared using independent samples *t*-tests and one-way independent analysis of variance (ANOVA). Correlations were used to determine student tendency toward social or technical computer skills. Four major research questions were addressed in this study with data analysis conducted for each question.

Research Question One: What was the (1) perceived aptitude of college students toward the dependent variables of (A) social and (B) technical computer technology based upon the independent variables of (a) age, (b) gender, (c) ethnicity, (d) class standing, and (e) academic major? Technical aptitude data were collected from survey questions three through 23 and 36 through 42. Social aptitude data were collected from survey questions 24 through 35 and 43 through 46. Demographic data were collected from survey questions 100 through 105. Frequency and percentage distributions were applied to the data using means, percentages, standard deviations and standard error for all social aptitude, technical aptitude, and demographic questions. Group means were assessed using independent samples *t*-tests and one-way ANOVA to understand factors influencing perceived student social and technical computer aptitude.

Using the Statistical Package for the Social Sciences (SPSS), version 15 (Field, 2005) a *t*-test produced group statistics on perceptions of social and technical aptitude toward computer technology based upon gender and ethnicity. A one-way ANOVA produced group statistics on perceptions of social and technical aptitude toward computer

technology based upon age, major, and class. Cronbach's alpha for internal consistency was .960 for the social and technical aptitude scale.

On average, using a scale of one to five with five being highest, females had a higher perception of social aptitude toward computer technology (M = 69.36, SE =.36), than males (M = 68.03, SE = .59). This difference was not significant for equality of means $t(595.99) = 1.92$, $p > .05$. Males however had a higher perception of technical aptitude toward computer technology (M = 112.92, SE 1.03), than females (M = 110.03, SE = .69). This difference was significant for equality of means $t(1050) = -2.36$, $p <. 05$.

Table 3 shows the frequencies and percentages for perceived social and technical aptitude toward computer technology of college students based on gender. Table 4 shows the results of the independent samples t-tests for perceived social and technical aptitude of college students toward computer technology based on gender (Huck & Cormier, 1996).

Table 3.

Frequencies and percentages for the independent variable gender for social aptitude and technical aptitude of college students toward computer technology

Dependent Variables	Gender	N	Mean	SD	SE
Social Aptitude	Female	712	69.36	9.51	.36
	Male	340	68.04	10.83	.59
Technical Aptitude	Female	712	110.03	18.37	.69
	Male	340	112.92	18.98	1.03

Table 4.

Comparison of sample means by gender using independent samples *t*-tests for social aptitude and technical aptitude of college students toward computer technology

Dependent Variables	Gender	*t*	*df*	Sig. (2-tailed)
Social Aptitude	Female vs. Male	1.921	595.000	.055
Technical Aptitude	Female vs. Male	-2.362	1050	.018*

*$p < .05$

Using a scale of one to five with five being highest, Whites on average had a higher perception of social aptitude toward computer technology ($M = 69.23$, SE =.33), than Nonwhites ($M = 67.24$, SE = .86). This difference was significant for equality of means $t(203.44) = 2.16$, $p<.05$. Whites also had a higher perception of technical aptitude toward computer technology ($M = 111.07$, SE =.62) than Nonwhites ($M = 110.37$, SE = 1.52) however this difference was not significant $t(1050) = .44$, $p>.05$.

Table 5 shows the frequencies and percentages for perceived social and technical computer technology aptitude of college students based on ethnicity. Table 6 shows the results of the independent samples *t*-tests for perceived social and technical aptitude of college students toward computer technology based on ethnicity (Huck & Cormier, 1996).

Table 5.

Frequencies and percentages for the independent variable ethnicity for social aptitude and technical aptitude of college students toward computer technology

Dependent Variables	Ethnicity	N	Mean	SD	SE
Social Aptitude	White	895	69.23	9.79	.33
	Nonwhite	157	67.24	10.81	.86
Technical Aptitude	White	895	111.07	18.53	.62
	Nonwhite	157	110.37	19.07	1.52

Table 6.

Comparison of sample means by ethnicity using independent samples *t*-tests for social aptitude and technical aptitude of college students toward computer technology

Dependent Variables	Ethnicity	*t*	*df*	Sig. (2-tailed)
Social Aptitude	White vs. Nonwhite	2.16	203.44	.032*
Technical Aptitude	White vs. Nonwhite	.44	1050	.663

*$p < .05$

Analysis of variance procedures were performed for social and technical aptitude perceptions of college students toward computer technology based upon age, academic major and class. There was a significant effect for age on social aptitude perceptions toward computer technology, $F(3, 1048) = 6.132, p < .05$ but no significant effect of age on technical aptitude perceptions toward computer aptitude, $F(3, 1048) = .631, p > .05$.

There was a significant effect for academic major on perceptions of both social aptitude toward computer technology, $F(4, 1047) = 5.151, p < .05$ and technical aptitude toward computer technology, $F(4, 1047) = 5.243, p < .05$ of college students. There was no significant effect for class on perceptions of either social aptitude, $F(3, 1032) = .362, p > .05$ or technical aptitude, $F(3, 1032) = .900, p > .05$ toward computer technology. Table 7 shows the results of the three one-way ANOVAs for social and technical aptitude toward computer technology by age, academic major and class (Huck & Cormier, 1996).

Table 7.

Analysis of variance for social aptitude and technical aptitude of college students toward computer technology by age (A), academic major (M) and class (C)

Source		*df*	*SS*	*MS*	*F*
		Social Aptitude (*N* = 1051)			
Between Groups	(A)	3	1801.93	600.64	6.13*
	(M)	4	2016.04	504.01	5.15*
	(C)	3	107.75	35.92	.36
Within Groups	(A)	1048	102651.72	97.95	
	(M)	1047	102437.61	97.84	
	(C)	1032	102408.18	99.23	
Total	(A)	1051	104453.65		
	(M)	1051	104453.65		
	(C)	1035**	102515.93		
		Technical Aptitude (*N*=1051)			
Between Groups	(A)	3	656.65	218.88	.60
	(M)	4	7146.99	1786.75	5.24*
	(C)	3	932.94	310.98	.90
Within Groups	(A)	1048	363327.18	346.69	
	(M)	1047	356836.84	340.82	
	(C)	1032	356677.19	345.62	
Total	(A)	1051	363983.83		
	(M)	1051	363983.83		
	(C)	1035**	357610.13		

*$p < .001$

**missing data for 16 entries resulted in lower *N* value for class

Research Question Two: What was the (1) attitude of college students toward the dependent variables of (A) social and (B) technical computer technology based upon the independent variables of (a) age, (b) gender, (c) ethnicity, (d) class standing, and (e) academic major? Technical attitude data were collected from survey questions 47 through 76. Social attitude data were collected from survey questions 77 through 99.

Demographic data were collected from survey questions 100 through 105. Reliability was tested using Cronbach's reliability coefficient with .7 or higher as the standard of measurement. Frequency and percentage distributions were applied to the data using means, percentages, standard deviations, and standard error for all social attitude, technical attitude, and demographic questions. Group means were assessed using independent *t*-tests and one-way analysis of variance (ANOVA) to understand factors influencing student social and technical computer attitude.

Using SPSS (Field, 2005), a *t*-test produced group statistics on perceptions of social and technical attitude toward computer technology based upon gender and ethnicity. A one-way ANOVA produced group statistics on social and technical computer technology attitude based upon age, major, and class. Cronbach's alpha for internal consistency was .69 for the social and technical attitude scale.

On average, using a scale of one to five with five being highest, males had a higher perception of social attitude toward computer technology ($M = 67.51$, SE =.50), than females ($M = 64.92$, SE = .26). This difference was significant for equality of means $t(537.52) = -4.60$, $p < .05$. Males also had a higher perception of technical attitude toward computer technology ($M = 91.04$, SE .56), than females ($M = 88.75$, SE = .29). This difference was significant for equality of means $t(524.03) = -3.607$, $p < .05$.

Table 8 shows the frequencies and percentages for social and technical attitude toward computer technology based on gender. Table 9 shows the results of the independent samples *t*-tests for social and technical attitude of college students toward computer technology based on gender (Huck & Cormier, 1996).

Table 8.

Frequencies and percentages for the independent variable gender for social attitude and technical attitude of college students toward computer technology

Dependent Variables	Gender	N	Mean	SD	SE
Social Attitude	Female	712	64.92	7.06	.26
	Male	340	67.51	9.17	.50
Technical Attitude	Female	712	88.75	7.73	.29
	Male	340	91.04	10.41	.56

Table 9.

Comparison of sample means by gender using independent samples *t*-tests for social attitude and technical attitude of college students toward computer technology

Dependent Variables	Gender	*t*	*df*	Sig. (2-tailed)
Social Attitude	Female vs. Male	-4.60	537.52	.000*
Technical Attitude	Female vs. Male	-3.60	524.03	.000*

*$p < .001$

Using a scale of one to five with five being highest, Nonwhites on average had a higher perception of social attitude toward computer technology ($M = 66.03$, SE =.72), than Whites (M =65.71, SE = .26). This difference was not significant for equality of means $t(1050) = -.46$, $p > .05$. Nonwhites also had a higher perception of technical attitude toward computer technology ($M = 90.13$, SE = .85) than Whites ($M = 89.38$, SE = .28). This difference was not significant for equality of means $t(191.80) = -.84$, $p > .05$.

Table 10 shows the frequencies and percentages for social and technical attitude of college students toward computer technology based on ethnicity. Table 11 shows the results of the independent samples *t*-tests for social and technical attitude of college students towards computer technology based on ethnicity (Huck & Cormier, 1996).

Table 10.

Frequencies and percentages for the independent variable ethnicity for social attitude and technical attitude of college students toward computer technology

Dependent Variables	Ethnicity	N	Mean	SD	SE
Social Attitude	White	895	65,71	7.68	.26
	Nonwhite	157	66.03	9.06	.72
Technical Attitude	White	895	89.38	8.39	.28
	Nonwhite	157	90.13	10.59	.85

Table 11.

Comparison of sample means by ethnicity using independent samples *t*-tests for social attitude and technical attitude of college students toward computer technology

Dependent Variables	Ethnicity	*t*	*df*	Sig. (2-tailed)
Social Attitude	White vs. Nonwhite	-.46	1050	.65
Technical Attitude	White vs. Nonwhite	-.84	191.81	.40

*$p<.05$

Analysis of variance procedures were performed for social and technical attitude of college students toward computer technology based upon age, academic major and class. There was no significant effect by age on social attitude toward computer technology, $F(3, 1048) = .50, p > .05$ or technical attitude toward computer technology, $F(3, 1048) = 1.06, p > .05$ of college students. There was no significant effect by academic major on social attitude toward computer technology, $F(4, 1047) = 1.05, p > .05$ or technical attitude on computer technology, $F(4, 1047) = .98, p > .05$ of college students. There was no significant effect of class on either social attitude toward computer technology, $F(3, 1032) = 1.32, p > .05$ or technical attitude toward computer technology, $F(3, 1032) = .900, p > .05$ of college students. Table 12 shows the analysis of variance results of the three one-way ANOVAs (Huck & Cormier, 1996).

Table 12.

Analysis of variance for social attitude and technical attitude toward computer technology of college students by age (A), academic major (M) and class (C)

Source		*df*	*SS*	*MS*	*F*
		Social Attitude (N = 1051)			
Between Groups	(A)	3	94.29	31.43	.50
	(M)	4	261.35	65.34	1.05
	(C)	3	244.36	81.45	1.32
Within Groups	(A)	1048	65409.35	62.41	
	(M)	1047	65242.29	62.31	
	(C)	1032	102408.18	99.23	
Total	(A)	1051	65503.64		
	(M)	1051	65503.64		
	(C)	1035**	77456.35		
		Technical Attitude (N=1051)			
Between Groups	(A)	3	243.58	81.19	1.06
	(M)	4	301.16	75.29	.98
	(C)	3	47.75	15.92	.21
Within Groups	(A)	1048	80217.36	76.54	
	(M)	1047	80159.78	76.56	
	(C)	1032	77408.60	75.01	
Total	(A)	1051	80460.94		
	(M)	1051	80460.94		
	(C)	1035**	77456.35		

* $p<.05$
**missing data for 16 entries in the class category

Research Question Three: Were there significant differences between social technology and technical technology perceptions of aptitude and attitude in college students? One-way ANOVAs and independent *t*-tests were used to determine significance in all levels of variables. Results of the independent samples *t*-tests revealed males had significantly higher perceptions of technical aptitude toward computer

technology than females. Males also had higher levels of both social and technical attitude toward computer technology than females. Whites had higher perceptions of social aptitude toward computer technology than Nonwhites.

Significance was assessed using Tukey's HSD post hoc test to compare all groups of participants with each other where there were four or more levels of independent variables in the one-way ANOVA tests. A one-way ANOVA used to determine perceptions of social aptitude toward computer technology by age revealed a significant F ratio of 6.13 ($p < .001$), which indicated there was a difference between groups. Tukey's post hoc multiple comparison test indicated that there were no significant differences between the ages of 18 – 19 (M = 69.42); 20 – 21 (M = 69.05); 22 – 25 (M = 69.03) however the college students aged 26 years and older (M = 63.46) had significantly lower means from the 18 - 25 year olds in terms of social aptitude toward computer technology in college students ($p < .05$).

Social aptitude toward computer technology by major revealed a significant F ratio of 5.15 ($p < .001$) in the one-way ANOVA. Tukey's post hoc multiple comparison test indicated that Apparel (M = 70.06) and Business (M = 70.73) majors had significantly higher means from Agriculture majors (M = 66.04) with regard to social aptitude toward computer technology ($p < .05$). Business majors also had significantly higher means from those majors in the Other category (M = 68.01) with regard to social aptitude toward computer technology. Arts and Science majors had no significant differences from any of the majors in the area of social aptitude toward computer technology.

Technical aptitude of college students toward computer technology by major revealed a significant F ratio of 5.24 ($p < .001$) in the one-way ANOVA. Tukey's post hoc test indicated that Business majors (M = 115.30) had significantly higher means from Arts and Sciences majors (M = 111.31) and from Other majors (M = 108.64) with regard to technical aptitude of computer technology. No significant differences were found with Apparel or Agriculture majors with regard to technical aptitude of computer technology. There were no significant differences in social and technical attitude by age, academic major or class.

Research Question Four: What was the correlation between perceived social aptitude, technical aptitude, social attitude and technical attitudes of college students? Pearson product correlation coefficients measured the relationship between the attitude (CAS) and perceived aptitude (CSE) and social and technical skills using data from survey questions three through 99. Basic correlation analysis was used to determine the significance and strength of the effect of the relationships among the study variables.

Pearson correlation coefficients were calculated between social aptitude, technical aptitude, social attitude, and technical attitude. There was a strong positive correlation between both social aptitude with technical aptitude ($r = .801$) and social attitude with technical attitude ($r = .677$). There were moderate positive correlations between both technical aptitude with social attitude ($r = .135$) and technical aptitude with technical attitude ($r = .119$). There were low positive correlations between both social aptitude with social attitude (r = .063) and social aptitude with technical attitude (r = .043). All the scores were positively related and are reported in Table 13 (Huck & Cormier, 1996).

Table 13.

Comparison of social aptitude (SocApt), technical aptitude (TechApt), social attitude (SocAtt), and technical attitude (TechAtt) scores for college students (n = 1052)

	SocApt	TechApt	SocAtt	TechAtt
Social Aptitude	1.00			
Technical Aptitude	.801**	1.00		
Social Attitude	.063*	.135**	1.00	
Technical Attitude	.043	.119**	.677**	1.00

*$p < .05$ (2-tailed)
**$p < .01$ (2-tailed)

Chapter Summary

The current study was designed to identify any differences in college students' perceptions of aptitude and attitude in social and technical computer technology. The findings included significant effects of social aptitude by age and major and technical aptitude by major. Whites had significantly higher perceptions of social aptitude toward computer technology than Nonwhites. Males had significantly higher perceptions of technical aptitude, and both social and technical attitude toward computer technology than females. Class standing had no significant effect on college student's perceptions of either aptitude or attitude in social or technical computer technology.

CHAPTER V

Summary, Conclusions, and Recommendations

Introduction

Studies have shown an increasing number of jobs require the use of technology (Larson & Smith, 1994; Dickerson, 2003; McAulay, 1993; Fraser & Goldstein, 1985). Software applications in the apparel industry specifically have increased over the past 10 to 15 years and college graduates with technology competencies tend to make a smoother transition into a professional career (Devane, 1992; Lee-Kang, 1994; Miller, Stanney, & Wooten, 1997; Levine & Donitsa-Schmidt, 1997; Dickerson, 2003). It has been widely assumed that undergraduates today have technological savvy well beyond that of their predecessors,(McAulay, 1993; Howe & Strauss, 2000). However with the emphasis being placed on specialized industry software as well as office-based technology on the job, students are finding that they are not as prepared as they should be upon graduation. Study findings suggest that caution is required when making assumptions regarding computer attitude and perceived computer aptitude of college students in computer dependent courses (Karston & Roth, 1998).

In addition to a summary of the study, this chapter also contains specific answers to the research questions, conclusions from the data collection and analysis, recommendations for practice and further research, and a discussion on the theoretical framework for the study. A chapter summary concludes this study.

Summary of the Study

There have been many studies conducted in the area of computer technology and higher education including computer based vs. text based instruction; computer

programming; technology as entertainment; technology in new student orientation programs; technological skill level of students in community colleges; instructional and administrative technology use; and web-based vs. handwritten survey methods. In addition, demographics have influenced technology research with many studies focusing on ethnicity, Internet addiction, socio-economic conditions, computer anxiety, age, and gender as related to computer technology. Studies examining technology use in higher education have focused on cognitive impacts of information technology use (Flowers, Pascarella & Pierson, 2000); student use of technology for research (Nowicki, 2003); and the Internet usage of instant messaging and online chat vs. non-Internet users (Jones, 2002).

A study by Vicario, Henninger, Austin, and Chambliss (2002) studied risks associated with increased reliance on technology, including e-mail, instant messaging, and cell phones. Results included significance in college major and gender on communication preferences and behavior. A study by Twale and Schaller (2003) addressed student perceptions of technical competence with regard to usage and application. Results found regardless of perceived level of technical competence, students make gains over time in hardware and software. Gender differences indicated more men used software applications, the Internet, and the web, while women indicated more willingness to ask for help.

A study by Sax (2001) examined how entering college students' technological preparedness, specifically Internet and email use, varied by socioeconomic factors such as race, class, and gender. Consistent with other studies (Flowers & Zhang, 2003; Madigan & Goodfellow, 2005; Ching, Basham, & Fang, 2005) conducted on the general

population, this study showed that technological preparedness is driven by socioeconomic factors such as race and class and in some cases gender. Many studies on computer anxiety have been conducted (Smith & Caputi, 2001; Ayersman, 1996; Todman & Lawrenson, 1992;) with results of computer anxiety being reduced when pre and post treatments were applied. Studies with respect to age of college students examining lifestyles, attitudes, and media habits of the Net Generation (Napoli & Ewing, 2001) resulted in four groups based on differences in lifestyle and demographic characteristics. An Internet addiction study by Leung (2004) reinforced previous research that dependents of the Internet spent most of their time in the synchronous communication environment engaging in interactive online activities. Many gender studies analyzed differences in self-reported IT skills and attitudes of male and female students (Lee, 2003; Sherman, End, Kraan, Cole, Campbell, Birchmeier, & Klausner, 2000; Imhof, Vollmeyer, & Beierlein, 2006) suggesting that differences do exist between college men and women in how they experience technology. In particular, men tended to spend more time and outperformed women at computer competency. Shashaani (1993; 1997) studied gender differences in high school and college students with respect to attitude toward computer technology. Results concluded females were less interested and less confident than males in computer technology.

College and university admissions offices are taking advantage of social technology in their recruitment methods. In the era of Facebook, MySpace and instant messaging, prospective college students are open to admissions recruitment methods that rely on social networking technology according to a report sponsored by the Noel-Levitz consulting firm, the James Tower recruiting firm and the National Research Center for

College and University Admissions, a nonprofit research organization (Roach, 2006). The study's findings reflect the changing face of e-recruitment reporting that 43% of college-bound students have created a profile on a college or university website similar to Facebook and MySpace social networking sites. Blogs, MySpace pages and podcasts are being used by college bound students to engage in social networking activities that build communities. The data found on these websites provide clearer indications of student preferences for electronic communication and e-recruitment at the university level. The study also indicates that 63% of students would read a blog authored by a faculty member as a way to seek more information about students and faculty at a particular institution. While e-mail and Internet were the key e-recruitment tools, the survey shows that students are increasingly using technologies such as instant messaging and cell phones. More than half of all online American youths ages 12-17 use online social networking sites according to a national survey of teenagers conducted by the Pew Internet & American Life Project (Lenhart & Madden, 2007). Factors associated with computer and Internet expertise in a select population found that 41% of the variance for technological expertise was explained by predictors. These predictors include: Internet skills; Internet and computer overuse and abuse; computer/math skills; weekly Internet use; gender; and Internet and computer competency (Morahan-Martin & Schumacher, 2007).

A series of studies (Walters & Necessary, 1996; Necessary & Parish, 1996)) were conducted to determine attitude differences among college undergraduates, if those who used computers demonstrated more favorable attitudes toward computers, and whether having more computer experience was related to less anxiety, more confidence, greater computer knowledge, and better liking of computers. Results concluded that increased

levels of computer use were related with reduced levels of anxiety, enhanced computer confidence, greater computer knowledge and increased liking for the computer. A study by Bracey (1988) showed that students' anxiety over using computers has a negative effect on computer aptitude.

Smith and Necessary (1996) investigated college students' computer literacy levels and their attitudes toward computers based on specific demographic variables such as gender, age, computer experience, overall knowledge of computers, computer ownership, and weekly computer usage. The results of the research revealed that experience with computers led to higher Computer Attitude Scale (CAS) scores. Non-traditional students scored significantly better on the CAS than their younger counterparts. There were significant effects for gender, however the interaction between gender and computer experience suggested that females may score lower on literacy due to their lack of experience. Demographic differences were also implied through this study.

A study by Karsten and Roth (1998) focused on identifying relationships that existed among computer experience, computer self-efficacy, and computer-dependent performance in an introductory computer literacy course. Study findings suggested that although a wide variety of computer experiences enhanced the student perceptions of their computer competencies, only those experiences that developed or enhanced the specific computer skills defined to comprise computer literacy in a particular context were likely to have an impact on computer-dependent course performance. The relevance of prior computer experience seemed to matter more than its quantity. A significant relationship was found between student perceptions of computer literacy and

course performance, although not strong. These results offered support for continuing a basic training approach in college courses designed to develop and enhance student computer literacy.

Technology and the way it is used by students and higher education institutions has changed rapidly over the past several years. Students in higher education today represent the first generation to have grown up with information and communication technology, surrounded by computers, video games, MP3 players, cell phones and other social, digital communication devices (Prensky, 2001). As technology continues to change and as students continue to become more technologically advanced, administrators and instructors must recognize and address deficiencies in college curriculum.

Although there is substantial research focusing on computer technology and its use, little research has been conducted on technical computer technology and social technology and the impact on college students. Students arrive on college campuses knowing how to use a computer or use technology for a number of purposes, but those purposes are not necessarily the ones that will make the students successful. They can chat online with their friends, download MP3 files, or engage in instant messaging, but they lack the proficiency in using computer software as well as information-processing skills that are important in college and many careers (Young, 2004). Multiple studies have been conducted measuring computer technology in various aspects, including computer anxiety, digital divide, ethnicity, Internet addiction, age, gender and even social technology risks, but none have measured attitudes and perceived aptitude of social technology skills and technical technology skills of today's undergraduate student. By

measuring the attitude and perceived aptitude of college undergraduates, assessing their social and technical skills in computer technology with reference to their age, gender, ethnicity, class standing, and academic major, implications for future instructional methods as well as vocational decisions can be made. This research examined college student perceptions of aptitude and their attitude toward social and technical computer technology with respect to age, gender, ethnicity, class standing, and academic major.

Purpose of the Study

The purpose for conducting the study was to explore college student's perceived capability regarding specific technical technology skills and knowledge. Specifically, the study explored the perceived aptitude and attitudes of university students majoring in apparel merchandising and design as well as other related and non-related majors toward social and technical computer technology.

Perceptions of aptitude and attitude toward social and technical computer technology were measured using a modification of an existing computer self-efficacy survey and a computer attitude scale to include the tendencies toward social as well as technical technology. The participants for the investigation were college undergraduate apparel merchandising and design students and students from other related and non-related majors. Once students completed the attitude and aptitude perception survey, independent *t*-tests, one way analysis of variance (ANOVA) tests, and correlations as well as frequency and percentage distributions were used to analyze the data with respect to age, gender, ethnicity, class standing, and academic major to determine student tendency toward social or technical computer skills.

Significance of the Study

Technology has had an intense impact not only on colleges and universities, but also on university students. Students come to college already having developed advanced computer and technological skills. Computers play a crucial role in education and business, causing the question of what constitutes computer aptitude to be more crucial than before. The rapid pace of technological advances in many industries, including the apparel industry, has forced businesses to demand a computer literate workforce (Smith & Necessary, 1996). By measuring the perceived computer aptitude of college students toward basic office software applications, the student, faculty, and employer may gain a better understanding of the student's technological capabilities regarding specific computer related knowledge and skills, enabling them to be more productive in school and at work. Net Generation college students have grown up with technology and access to computers and technology is expected. Their perceived aptitudes and attitudes toward technology differ based upon their demographics. The type of technology skills students utilize also differ, with some having more tendencies toward social technology while others have more tendencies toward technical technology.

This study researched the tendencies of students toward social or technical computer competencies based upon specific demographic characteristics of age, gender, ethnicity, class standing, and academic major with implications for accrediting bodies, higher education administration, faculty, students, and employers who could be affected by this generation's technological attitudes and aptitudes.

This chapter consists of the conclusions from the data collection and analysis, recommendations for practice and further research, and a discussion on the theoretical framework for the study. A chapter summary concludes this study.

Statement of the Research Questions and Results

Students in apparel merchandising and design programs are expected to have technical, office-based technology skills not only to perform class assignments, but also to prepare for the next level of computer instruction in specialized software applications. Without this technical technology ability, the success rate is greatly diminished in utilizing the specialized software. Industry expects graduates to have a good understanding of office-based technical computer technology to be successful in the business environment. By measuring the perceived attitude and aptitude of students to assess social and technical competencies in computer technology with reference to their age, gender, ethnicity, class standing, and academic major, there could be implications for future instructional methods as well as vocational decisions. Four research questions were addressed in the study.

Research Question One: What was the (1) perceived aptitude of college students toward the dependent variables of (A) social and (B) technical computer technology based upon the independent variables of (a) age, (b) gender, (c) ethnicity, (d) class standing, and (e) academic major? On average, females had a higher perception of social aptitude toward computer technology than males, however this difference was not statistically significant. Males, on average, had a higher perception of technical aptitude toward computer technology than females and this difference was statistically significant. In terms of ethnicity, Whites on average had a higher perception of social aptitude toward

computer technology than Nonwhites, which was statistically different. Whites also had a higher perception of technical aptitude toward computer technology than Nonwhites however this difference was not significant. There was a significant effect of age on social aptitude perceptions toward computer technology but no significant effect by age on technical aptitude perceptions toward computer aptitude. There was a significant effect of academic major on perceptions of both social aptitude toward computer technology, and technical aptitude toward computer technology of college students. There was no significant effect of class on perceptions of either social aptitude toward computer technology or technical aptitude toward computer technology.

Research Question Two: What was the (2) attitude of college students toward the dependent variables of (A) social and (B) technical computer technology based upon the independent variables of (a) age, (b) gender, (c) ethnicity, (d) class standing, and (e) academic major? On average, males had a higher perception of social attitude and technical attitude toward computer technology than females. Both differences were statistically significant. Nonwhites on average had a higher perception of social attitude and technical attitude toward computer technology than Whites. Neither of these differences was statistically significant. There was no significant effect by age, academic major or class on social or technical attitude toward computer technology.

Research Question Three: Were there significant differences between social technology and technical technology perceptions of competency in college students? Results of research questions one and two revealed that males had higher perceptions of technical aptitude toward computer technology than females. Males also had higher levels of both social and technical attitude toward computer technology than females.

Whites had higher perceptions of social aptitude toward computer technology than Nonwhites. There was a significant difference by age for perceptions of social aptitude toward computer technology. Further testing indicated that there were no significant differences between the ages of 18 and 25 however the college students who were over 25 had significantly lower mean scores from the 18 to 25 year olds in terms of social aptitude toward computer technology in college students.

Social aptitude toward computer technology by major revealed a statistically significant difference. Further testing indicated that Apparel and Business majors had significantly higher mean scores compared to Agriculture majors with regard to social aptitude toward computer technology. Business majors had significantly higher mean scores compared with the mean scores in the Other category with regard to social aptitude toward computer technology. Arts and Science majors had no significant differences from any of the majors in the area of social aptitude toward computer technology.

Technical aptitude of college students toward computer technology by major revealed a significant difference. Further testing indicated that Business majors had significantly higher mean scores as compared to Arts and Sciences majors, with regard to technical aptitude of computer technology. Business majors also revealed significantly higher mean scores from Other majors in the area of technical aptitude of computer technology. There were no significant differences in the mean scores of Apparel and Agriculture majors with respect to technical aptitude. No significant differences were found in social and technical attitude by age, academic major or class.

Research Question Four: Was there a correlation between perceptions of (1) aptitude, (2) attitude and (A) social or (B) technical competencies of college students?

There were strong positive correlations between social aptitude with technical aptitude and social attitude with technical attitude. Moderately positive correlations were found between social attitude with technical aptitude and technical attitude with technical aptitude. There were low positive correlations between social aptitude with social attitude and social aptitude with technical attitude.

Conclusions

This study researched college student perceptions toward social or technical computer aptitude and attitudes based upon specific demographic characteristics of age, gender, ethnicity, class standing, and academic major. Social aptitude includes using the Internet, search engines such as Google or Yahoo, e-mail, instant messaging, computer gaming, online shopping, blogging, social networking such as Facebook and MySpace, and online chat rooms. Technical aptitude includes working with computer files, storage devices, software programs including office based programs such as Excel, spreadsheets, and word documents, creating PowerPoint presentations, using graphic software such as Photoshop and Illustrator, web page creation and course management systems such as WebCT and Blackboard. Social and technical attitudes refer to these areas of technology from the perspective of anxiety, confidence, and liking when using the technology, either socially or technically. Data were collected based on these descriptions and the following conclusions can be drawn from the results of the data analysis.

Gender

Females scored higher in their perception of aptitude toward social technology such as e-mailing, instant messaging, downloading music and computer games, using social networks such as Facebook and MySpace more than males, however the difference

was not enough to be statistically significant. Males scored significantly higher in their perceptions of aptitude toward technical technology, such as office based software packages, web page creation and graphic software. Males also scored higher in their perception of social and technical attitude such as lack of anxiety, confidence and general liking toward computer technology than females. These perceptions were all statistically significant. These findings are consistent with previous research on gender differences, finding differences existing between college men and women in how they experienced computer technology. According to precious studies (Lee, 2003; Sherman, End, Kraan, Cole, Campbell, Birchmeier, & Klausner, 2000; Imhof, Vollmeyer, & Beierlein, 2006) differences do exist between college men and women in how they experience technology. In particular, men tend to spend more time and outperformed women at computer competency. In addition, Shashaani (1993; 1997) concluded females were less interested and less confident than males in computer technology.

Ethnicity

In terms of ethnicity, Whites scored significantly higher on perceptions of social aptitude toward computer technology such as emailing, instant messaging, downloading music and computer games, using social networks such as Facebook and MySpace than Nonwhites. Whites also scored higher on perceptions of technical aptitude such as office based software packages, web page creation and graphic software toward computer technology than Nonwhites however this difference was not significant. Nonwhites, on average, had higher perceptions of social attitude and technical attitude such as a lack of anxiety, confidence and general liking toward computer technology than Whites, however these differences were not statistically significant. College students'

technological preparedness, specifically Internet and email use, varies by socioeconomic factors such as race according to Sax (2001). Other previous research (Flowers & Zhang, 2003; Madigan & Goodfellow, 2005; Ching, Basham, & Fang, 2005) on computer technology with regard to ethnicity found that technological preparedness is driven by socioeconomic factors such as race. This research is consistent with those findings. However attitudes by Nonwhites, even though not statistically significant, showed higher averages than Whites.

Age

When testing for differences in social and technical aptitude perceptions of college students toward computer technology based upon age, this study found a significant effect of age on social aptitude perceptions such as emailing, instant messaging, downloading music and computer games, using social networks such as Facebook, and MySpace toward computer technology. However, no significant effect of age on technical aptitude perceptions toward computer aptitude were found. Further testing indicated that there were no significant differences of those respondents who were between the ages of 18 and 25. However, college students who were over 25 had significantly lower mean scores for social aptitude toward computer technology from the 18 to 25 year olds. When testing for differences in social and technical attitude toward computer technology in college students based upon age no significant effect was found for social attitude or technical attitude toward computer technology of college students. Research has shown that the Net Generation tends to be more technologically sophisticated than previous generations, using the Internet to communicate socially, for entertainment and to stay in touch with friends and family (Lenhart & Madden, 2007;

Napoli & Ewing, 2001). There were differences between the Net Generation age group (18 to 25) as compared to the older generations (25 and older) in computer aptitude, however no differences were found in attitudes of liking, confidence, or anxiety toward computer technology.

Academic Major

There was a significant effect of academic major on perceptions of both social aptitude toward computer technology, and technical aptitude toward computer technology of college students. Further testing indicated that Apparel and Business majors had significantly higher mean scores than Agriculture majors with regard to social aptitude toward computer technology. Business majors also had significantly higher mean scores from those majors in the Other category with regard to social aptitude toward computer technology. Arts and Science majors had no significant differences from any of the majors in the area of social aptitude toward computer technology.

Technical aptitude of college students toward computer technology by major revealed a significant difference. Further testing indicated that Business majors had significantly higher means than Arts and Sciences majors and majors in the Other category with regard to technical aptitude of computer technology. There was no significant effect of academic major on social attitude or technical attitude on computer technology of college students. Previous research by Karsten and Roth (1998) found a significant relationship between student perceptions of computer literacy and course performance offering support for continuing a basic training approach in college courses designed to develop and enhance student computer literacy.

Class Standing

There were no significant effects of class on perceptions of either social aptitude toward computer technology or technical aptitude toward computer technology. There were also no significant effects of class on either social attitude or technical attitude toward computer technology of college students. The lack of significant results by class standing on either social or technical aptitude or attitude would seem to support results from previous studies related to age and the characteristics that these students tend to be more technologically savvy in some areas, regardless of their class standing in college.

Social and Technical Aptitude and Attitude

There were strong positive correlations of social aptitude with technical aptitude and social attitude with technical attitude. Social attitude with technical aptitude was positively correlated as was technical attitude with technical aptitude, however these correlations were moderate. There were low positive correlations of social aptitude with technical attitude and social aptitude with social attitude.

Results of previous studies (Walters & Necessary, 1996; Necessary and Parish, 1996) concluded that increased levels of computer use were related with reduced levels of anxiety, enhanced computer confidence, greater computer knowledge and increased liking for the computer. A study by Bracey (1988) showed that students' anxiety over using computers had a negative effect on computer aptitude.

The results of the correlations from data collected in this study support previous findings on attitudes and aptitudes of college undergraduates. The strong positive relationship of social aptitude with technical aptitude indicates a tendency toward positive perceived computer aptitudes, both socially and technically. The strong positive

relationship of social attitude with technical attitude indicates a tendency toward positive attitudes toward social and technical computer technology. The other correlations, although moderate to low, were all positive to support a relationship between attitude and aptitude toward both technical and social computer technology. Social technology and technical technology tend to be related when it come to attitudes and aptitude of college undergraduates toward computer technology.

Recommendations

For Practice

Accrediting bodies can accurately assess the technological offerings of apparel merchandising and design programs with documented student competency perceptions resulting from this study. Higher education administration and faculty could be impacted with the knowledge needed to develop and implement more meaningful technology curriculum in apparel merchandising and design programs. Employers could be more satisfied with the competencies and qualifications of apparel merchandising and design graduates. Students may benefit the most by receiving the needed technology exposure for successful academic and vocational careers based upon their needs. Secondary education can better prepare students for the technology skills needed in postsecondary education if they have a better understanding of the type of technology skills students have. University programs must prepare for the socially technical student. Apparel programs must be aware of the range of knowledge of both social and technical student types enrolling in specialized computer courses prior to teaching those courses. Industry must be aware of the type of technology skills students are entering the job market with.

The growing need for designers and merchandisers with CAD experience calls for CAD based curriculum in higher education clothing, textile, apparel, and merchandising programs. The US apparel industry needs to be technologically proficient to remain globally competitive and meet the ultimate consumers' needs. The current rapid developments in technology have implications for those involved in the apparel industry as well as the education and preparation of textiles and clothing professionals. Student interest and motivation for learning computer-aided-design systems has caused many apparel programs to review and revise their curricula. With the advent of even greater technological advances in the apparel industry, apparel merchandising and design students will need further exposure to computer-aided-design techniques. As the apparel business continues to demand versatility and creativity from its employees, competition from other countries and increased numbers of apparel designers and merchandisers entering the field will require experience with computer-aided-design programs. Educators must update curriculum and facilities to keep up with the accelerated computerization of the apparel industry. Before the update of apparel curriculum can be completed, student readiness must be assessed to determine true computer and technological skills. There can be a blending of social technology and technical technology in the classroom or work place. More students are using social technology skills, which are already being implemented in the learning and working environments by the use of e-mail, instant messaging, Facebook, and MySpace social networking sites. With the influx of social technology in the schools and industry, it is possible that technical technology aptitude and attitudes may be improved.

For Research

A better understanding of the computer gender gap will come from an appreciation of the Internet as a social technology in which online behaviors and attitudes are extensions of offline social processes and relationships. Further study of the social technology aptitudes of females may be needed based upon the higher means of females to males. More research may be needed to tailor computer-based instruction to the needs of students based on the social technological aspect which will also prepare students for computer based learning environments. A study of the non-traditional student might be beneficial to the discussion of age and technology based upon results of Net Generation aptitudes versus other generations. Another area for further research would be to determine the similarities and differences between related majors including Business, Apparel, and Arts and Sciences in the area of social and technical aptitude and attitude. A more detailed breakdown of related majors would be beneficial for the vocational choices of undergraduates.

Further research may be needed to study the types of technology currently being used in the apparel manufacturing and retailing industry. The application of that knowledge may be used in undergraduate curriculum to equip future designers, product developers, and merchandisers with the level of information needed to be competitive in a technology based apparel industry today.

Theoretical Framework

Holland's Theory of Vocational Personality Types and Fishbein's Learning Theory of Attitudes and Behaviors were reviewed as theoretical bases for the study. The

following is an affirmation of the theoretical framework of the study based on these two theories.

Holland's Theory

Holland assumed that individuals in a given occupation tend to have similar personality styles and individuals tend to enter specific occupational environments because of their interests and personalities, remaining in those occupations due to the reinforcements and satisfactions obtained through the interactions in that environment (Walsh & Holland, 1992). Holland also suggested a relationship between interests and aptitudes using the illustration that if an individual has interests similar to someone in Chemistry that they would probably have the abilities or aptitudes that were consistent with those likes and dislikes. An individual's personality type is the product of a life history and is in many ways learned. Holland's theory proposes that individuals tend to select and enter college major environments and occupational environments similar to their personality types.

Due to the personality types and the environmental models sharing a common set of concepts, Holland was able to classify people and environments in the same terms and predict an outcome by pairing people and environments (Holland, 1997). This research compared social and technical attitudes and aptitudes relating to Holland's theory of a relationship between interests and aptitudes. There were strong positive correlations of social aptitude with technical aptitude and social attitude with technical attitude, having implications to vocational aspects as suggested in Holland's theory and supporting the attributes in the theory for social and technical personality types and their related majors and future vocations.

Fishbein's Learning Theory

According to Fishbein's Learning Theory of Attitudes and Behaviors, a person's attitude toward any object is a function of beliefs about the object and the evaluative responses associated with those beliefs. Fishbein made this relationship a distinct part of his theory of attitude, which can be described as: an individual holds many beliefs about a given object, (that is the object may be seen as related to various attitudes such as other objects, characteristics, goals, etc.); associated with each of the attributes is an implicit evaluative response or attitude; through conditioning, the evaluative responses are associated with the attitude object; the conditioned evaluative responses form or consummate a cumulative effect; the attitude will bring out a summated evaluative response, which is the overall attitude (Fishbein, 1975). Fishbein's learning theory of attitudes and beliefs guided this research in determining the perceived aptitude and attitude of college undergraduates towards social or technical computer technology. The conclusions of this study support these theories by identifying and social and technical characteristics an individual may possess toward technology, leading education and industry to make informed technology decisions for the current and future generations.

Chapter Summary

Many studies have been conducted on the Net Generation and their relationship to other generations. Research has suggested that this generation is more technologically sophisticated, using the Internet to communicate socially, for entertainment and to stay in touch with friends and family. This study examined college student perceptions toward social or technical computer aptitude and attitudes based upon specific demographic

characteristics of age, gender, ethnicity, class standing and academic major. Social aptitude includes using the Internet, search engines such as Google or Yahoo, e-mail, instant messaging, computer gaming, online shopping, blogging, social networking such as Facebook and MySpace, and online chat rooms. Technical aptitude includes working with computer files, storage devices, software programs including office based programs such as Excel, spreadsheets, and word documents, creating PowerPoint presentations, using graphic software such as Photoshop and Illustrator, web page creation and course management systems such as WebCT and Blackboard. Social and technical attitudes refer to these areas of technology from the perspective of anxiety, confidence and liking when using the technology, either social or technical. Many of the results of this study are consistent with previous research.

Young female students tend have a higher affinity toward social technology aptitude than males while males tend to have a higher affinity toward technical technology aptitude than female students. White's and Nonwhite's technology perceptions and attitudes may be misleading due to a lack of consideration of socioeconomic conditions, as found in previous research on computer technology and race.

There were differences between the Net Generation age group of 18 to 25 year olds compared to older generations in computer aptitude, however no differences were found in attitudes of liking, confidence or anxiety toward computer technology. This suggests that there are likely differences in the traditional versus non-traditional student, which would be another study.

A more detailed breakdown of related majors would be beneficial for the vocational choices of undergraduates. The lack of significant effects of class standing on either social or technical aptitude or attitudes would seem to support the information on age and the characteristics of the Net Generation in that these students tend to be more technologically savvy in some areas regardless of their class standing in college.

Colleges and universities as well as industry are taking advantage of social technology not only for recruitment but in the classroom and on the job as well. A strong relationship between social and technical aptitude and social and technical attitude would tend to indicate that students are ready for this type of interaction.

REFERENCES

Alreck, P. L., & Settle, R. B. (1985). *The survey research handbook.* Homewood, IL: Richard D. Irwin, Inc.

Ayersman, D. J. (1996). Effects of computer instruction, learning style, gender and experience on computer anxiety. *Computers in Schools, 12*(4), 15-30.

Aviles, K., Phillips, B., Rosenblatt, T., & Vargas, J. (2005). If higher education listened to me. *Educause, 40*,(5), 17-28.

Banta, T., & Mzumara, H. R. (2004). Assessing information literacy and technological competence. *Assessment Update, 16*(5), 3-14.

Biemer, P. P., & Lyberg, L. E. (2003). *Introduction to survey quality.* Hoboken, NJ: John Wiley & Sons, Inc.

Bishop-Clark, C., & Wheeler, D. D. (1994). The Myers-Briggs personality type and its relationship to computer programming. *Journal of Research on Computing in Education, 26*(3), 358-371.

Bracey, G. W. (1988). Computers and anxiety in education: Round two. *Electronic Learning, 8*(3), 26-27.

Bugeja, M. J. (2006). Facing the facebook. *The Chronicle of Higher Education, 52*(21), C1-C4.

Carini, R. M., Hayek, J.C., Kuh, G.D., Kennedy, J. M., & Ouimet, J.A. (2003). College student responses to web and paper surveys: Does mode matter? *Research in Higher Education, 4*(1), 1-19.

Chak, K., & Leun, L. (2004). Shyness and locus of control as predictors of Internet addiction and Internet use. *CyberPsychology & Behavior, 7*(5), 559-570.

Ching, C. C., Basham, J. D., & Fang, E. (2005). The legacy of the digital divide: Gender, socioeconomic status, and early exposure as predictors of full-spectrum technology use among young adults. *Urban Education, 40*(4), 394-411.

Collier, B. J., & Collier, J. R. (1990). CAD/CAM in the textile and apparel industry. *Clothing and Textiles Research Journal, 8*(3), 7-13.

Collin, P. H. (1992). *Webster's concise English dictionary.* New York: Barnes and Noble Marlboro Books Corp.

Creighton, W., Kilcoyne, M., Tarver, R., & Wright, S. (2006). Computer literacy levels of students enrolling in a post-secondary computer applications/information technology course. *Information Technology, Learning, and Performance Journal, 24*(1), 15-23.

Cronbach, L. J. (1977). *Aptitudes and instructional methods.* New York: Irvington Pub.

Czaja, R., & Blair, J. (2005). *Designing surveys: A guide to decisions and procedures* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Devane, J. (1992). Training and education in CAD clothing/textiles systems. In W. Aldrich (Eds.), *CAD in clothing and textiles* (pp. 125-137). Osney Mead, Oxford, UK: Blackwell Scientific Publications, Ltd.

De Vaus, D. A. (1986). *Surveys in social research.* London, UK: George Allen & Unwin Publishers, Ltd.

Dickerson, K. G. (2003). *Inside the fashion business.* (7th ed.). Upper Saddle River, NJ: Prentice Hall.

Dorman, S. M. (2000). Implications for growing up digital. *Journal of School Health, 70*(10), 420-422.

Field, A. (2005). *Discovering statistics using SPSS.* (2nd ed.). London, England: Sage Publications Ltd.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research.* Reading, MA: Addison-Wesley.

Flowers, L., Pascarella, E. T., & Pierson, C. T. (2000). Information technology use and cognitive outcomes in the first year of college. *The Journal of Higher Education, 71*(6), 637-667.

Flowers, L., & Zhang, Y. (2003). Racial differences in information technology use in college. *College Student Journal, 37*(2), 235-242.

Fowler, F. J. (1988). *Survey research methods.* Beverly Hills, CA: Sage Publications.

Fraser, B. S., & Goldstein, H. (1985). *Training for work in the computer age: Policy implications.* Washington: National Institute for Work and Learning.

Geissler, J. E., & Horridge, P. (1993). University students' computer knowledge and commitment to learning. *Journal of Research on Computing in Education, 25*(3), 347-366.

Glass, G. V., & Hopkins, K. D. (1996). *Statistical methods in education and psychology.* (3rd ed.). Needham Heights, MA: Allyn & Bacon.

Glock, R. E., & Kunz, G. I. (2005). *Apparel manufacturing sewn product analysis.* (4thed.). Upper Saddle River, NJ: Prentice Hall.

Guzdial, M. (2002). Teaching the Nintendo Generation to Program. *Communications of the ACM, 45*(4), 17-21.

Harrison, A. W., & Rainer, R. K. (1992). An examination of the factor structures and concurrent validities for the computer attitude scale, the computer anxiety rating, and the computer self-efficacy scale. *Educational & Psychological Measurement, 52(3),* 735-746.

Hoffman, D. L., Novak, T. P., & Venkatesh, A. (2004). Has the internet become indispensable? *Communications of the ACM, 47*(7), 37-42.

Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments* Odessa, FL: Psychological Assessment Resources.

Howe, N., & Strauss, W. (2000). *Millennials rising: The next generation.* New York: Vintage Books.

Huck, S. W., & Cormier, W. H. (1996). *Reading statistics and research. (2nd ed.).* New York, NY: HarperCollins Publishers, Inc.

Imhof, M., Vollmeyer, R., & Beierlein, C. (2006). Computer use and the gender gap: The issue of access, use, motivation, and performance. *Computers in Human Behavior, 23,* 2823-2837.

Istook, C. S. (1992). Computer-Aided-Design (CAD) in the apparel industry: An exploration of current technology, training, and expectations for the future. *Dissertation Abstracts International, 53*(5), 2279. (UMI AAT9227093)

Istook, C. S., & Underwood, S. (1994, October). *A video introduction of apparel design techniques using a CAD program developed for the Macintosh computer.* Abstract of concurrent session paper presentation at the proceedings of the annual meeting of the International Textile & Apparel Association, Inc., Minneapolis, MN.

Jacoby, R. J. (2005). Computer based training: Yes or no? *Journal of Health Care Compliance, 7*(3), 45-46.

Jolliffe, F. R. (1986). *Survey design and analysis.* West Sussex, England: Ellis Horwood Limited.

Jones, S. (2002). *The Internet goes to college: How students are living in the future with today's technology.* Washington: Pew Internet & American Life Project.

Karsten, R., & Roth, R. M. (1998). The relationship of computer experience and computer self-efficacy to performance in introductory computer literacy courses. *Journal of Research on Computing in Educating, 31*(1), 14-25.

Katz, Y. J. (2002). Attitudes affecting college students' preferences for distance learning. *Journal of Computer Assisted Learning, 18*(1), 2-9.

Kay, R. H. (1993). A practical research tool for assessing ability to use computers: The computer ability survey (CAS). *Journal of Research on Computing in Education, 26*(1), 16-27.

Kleinglass, N. 2005. Who is driving the changing landscape in student affairs? In K. Kruger, (Ed.), *NewDirections for Student Services, 112*, (pp. 25-38). New York: Wiley Interscience.

Knoll, D.S. (1989). *Computers in the study of clothing and textile: Current use and future trends.* Unpublished Doctoral Dissertation, University of Arkansas, Fayetteville.

Kuehner, A. V. (1999). The effects of computer-based vs. text based instruction on remedial college readers. *Journal of Adolescent & Adult Literacy, 43*(2), 160-168.

Lamb, A., & Johnson, L. (2006). Want to be my "friend"? What you need to know about social technologies. *Teacher Librarian, 34*(1), 55-57.

Landt, D., Knazze, S., & Sud, P. (2001). Technology and grease: A formula for edutainment and efficiency. *Community College Journal of Research and Practice, 25*, 691-701.

Larson, J., & Smith, M. A. (1994). Proceedings from Selected Research and Development Presentations at the 1994 National Convention of the Association for Educational Communications and Technology: *An assessment of computer literacy and computer attitudes of incoming first-year students at the University of Wisconsin-Eau Claire, Eau Claire, Wisconsin.* ERIC 1 (ED373728).

Lee, A. C. K. (2003). Undergraduate students' gender differences in IT skills and attitudes. *Journal of Computer Assisted Learning, 19*(4), 488 – 501.

Lee-Kang, D. E. (1993). Factors affecting the adoption of instructional use of computers in undergraduate Textiles, Clothing, and Merchandising programs. *Dissertation Abstracts International, 54(11),* 4009. (UMI AAT9412003).

Lenhart, A., & Madden, M. (2007). *Social networking websites and teens: An overview.* Washington: Pew Internet & American Life Project.

Leung, L. (2004). Net-generation attributes and seductive properties of the Internet as predictors of online activities and Internet addiction. *CyberPsychology & Behavior, 7*(3), 333-348.

Levine, T., & Donitsa-Schmidt, S. (1997). Commitment to learning: Effects of computer experience, confidence and attitudes. *Journal of Educational Computing Research, 16*(1), 83-105.

Liaw, S. S. (2002). An internet survey for perceptions of computers and the World Wide Web: Relationship, prediction, and difference. *Computers in Human Behavior, 18(1),* 17-35.

Loyd, B. H., & Gressard, C. (1984). Reliability and factorial validity of computer attitude scales. *Educational and Psychological Measurement, 44*(2), 501-505.

Madigan, E., & Goodfellow, M. (2005). The influence of family income and parents education on digital access: Implications for first-year college students. *Sociological Viewpoints, 21,* 53-62.

Marsh, C. (1982). *The survey method.* London, UK: George Allen & Unwin Publishers.

McAulay, K. J. (1993). Computer use among college undergrads. *Journal of College Student Development, 34,* 230-231.

McIlroy, D., Bunting, B., Tierney, K., & Gordon, M. (2001). The relation of gender and background experience to self-reported computing anxieties and cognitions. *Computers in Human Behavior, 17,* 21-33.

McMillan, S. J. (2006). Coming of age with the Internet: A qualitative exploration of how the internet has become an Integral part of young people's lives. *New Media & Society, 8*(1), 73-95.

McPherson, E. M. (1987). *Apparel manufacturing management systems: A computer oriented approach.* Park Ridge, NJ: Noyes Publications.

Miller, L. A., Stanney, K. M., & Wooten, W. (1997). Development and evaluation of the Windows computer experience questionnaire (WCEQ). *International Journal of Human-Computer Interaction, 9*(3), 201-212.

Miller, M. T., & Pope, M. L. (2003). Integrating technology into new student orientation programs at community colleges. *Community College Journal of Research and Practice, 27,* 15-23.

Miller, M. T., Pope, M. L., & Steinmann, T. D. (2005). A profile of contemporary community college student involvement, technology use, and reliance on selected college life skills. *College Student Journal, 39*(3), 596-603.

Miller, M. T., & Viajar, P. (2001). The integration of technology in new student orientation programs. *The Journal of College Orientation and Transition, 9*(1), 33-40.

Morahan-Martin, J., & Schumacher, P. (2007). Attitudinal and experiential predictors of technological expertise. *Computers in Human Behavior, 23,* 2230-2239.

Murphy, C. A., Coover, D., & Owen, S. V. (1989). Development and validation of the computer self-efficacy scale. *Educational and Psychological Measurement, 49*(2), 893-899.

Murray, N. D. (1997). Welcome to the future: The millennial generation. *Journal of Career Planning and Employment, 57*(3), 36-42.

Napoli, J., & Ewing, M. E. (2001). The net generation: An analysis of lifestyles, attitudes and media habits. *Journal of International Consumer Marketing, 13*(1), 21-34.

Necessary, J. R., & Parish, T. S. (1996). The relationships between computer usage and computer-related attitudes and behaviors. *Education, 116*(3), 384-388.

Nowicki, S. (2003). Student vs. search engine: Undergraduate rank results for relevance. *Portal: Libraries and the Academy, 3*(3), 503-515.

Oblinger, D., & Oblinger, J. (2006). Is it age or IT: First steps toward understanding the Net Generation. *California School Library Association (CSLA) Journal, 29*(2), 8-16.

Olsen, F. (2000). Campus newcomers arrive with more skill, better gear. *The Chronicle of Higher Education, 47*(10), A39-43.

Palaigeorgiou, G. E., Siozos, P. D., Konstantakis, N. I., & Tsoukalas, I. A. (2005). A computer attitude scale for computer science freshmen and its education implications. *Journal of Computer Assisted Learning, 21,* 330-342.

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon, 9*(5), 1-6.

Rice, M. L., & Miller, M. T. (2001). Faculty involvement in planning for the use and integration of instructional and administrative technologies. *Journal of Research on Computing in Education, 33*(3), 328-336.

Roach, R. (2006). Prospective college students receptive to electronic social networking recruitment methods, survey finds. *Diverse: Issues in Higher Education, 23*(23), 40-43.

Robertson, L. J., & Stanforth, N. (1999). College students' computer attitudes and interest in web based distance education. *Journal of Family and Consumer Sciences, 91*(3), 60-64.

Sax, L. J. (2001). Technological preparedness among entering freshmen: The role of race, class, and gender. *Journal of Educational Computing Research, 24*(4), 363-383.

Schumacher, P., & Morahan-Martin, J. (2001). Gender, Internet, and computer attitudes and experiences. *Computers in Human Behavior, 17*, 95-110.

Selber, S. A. (2004). *Multiliteracies for a digital age*. Carbondale, IL: Southern Illinois University Press.

Shashaani, L. (1993). Gender-based differences in attitudes toward computers. *Computers Educ. 20*(2), 169-181.

Shashaani, L. (1997). Gender differences in computer attitudes and use among college students. *Journal of Educational Computing Research, 16*(1), 37-51.

Sheldon, G. J. (1988). The impact of technology on apparel designer training. *Clothing and Textiles Research Journal, 6*(4), 20-25.

Sherman, R. C., End, C., Kraan, E., Cole, A., Campbell, J., Birchmeier, Z., & Klausner, J. (2000). The Internet gender gap among college students: Forgotten but not gone? *CyberPsychology & Behavior, 3*(5), 885-894.

Smith, B., & Caputi, P. (2001). Cognitive interference in computer anxiety. *Behavior & Information Technology, 20*(4), 265-273.

Smith, B. N., & Necessary, J. R. (1996). Assessing the computer literacy of undergraduate college students. *Education, 117*(2), 188-194.

Snow, R. E. (1980). Aptitude processes. In R. E. Snow, P. Federico, & W. E. Montague, (Eds.), *Aptitude, learning, and instruction volume 1: Cognitive process analyses of aptitude* (pp. 27-63). Hillsdale, NJ: Lawrence Erlbaum Associates.

Spokane, A. R., & Cruza-Guet, M. C. (2005). Holland's theory of vocational personalities in work environments. In S. D. Brown, & R. W. Lent, (Eds.), *Career development and counseling: Putting theory and research to work* (pp. 24-41). Hoboken, NJ: John Wiley & Sons, Inc.

Tailored Clothing and Technology Corporation [TC]². Retrieved August 30, 2007 from http://www.tc2.com/what/bodyscan/index.html).

Tapscott, D. (1998). *Growing up digital: The rise of the net generation.* New York: McGraw-Hill.

Threlfall, K. D. (1995). Making a case for CAD in the curriculum. *Journal of Family and Consumer Sciences, 87*(1) 21-25.

Todman, J., & Lawrenson, H. (1992). Computer anxiety in primary schoolchildren and university students. *British Educational Research Journal, 18*(1), 63-72.

Twale, D. J., & Schaller, M. A. (2003). Mandatory computer purchases and student preparedness: Implications for new student orientation. *Journal of College Orientation and Transition, 10*(2), 60-69.

Vailes, K., Phillips, B., Rosenblatt, T., & Vargas, J. (2005). If higher education listened to me. *Educause, 40*(5), 17-28.

Vallender, J. H. (1992). Training and Education. In W. Aldrich (Ed.), *CAD clothing and textiles* (pp.125-137). Osney Mead, Oxford, UK: Blackwell Scientific Publications Ltd.

Vicario, T., Henninger, E., Austin, M., & Chambliss, C. (2002). College Students' Responses to New Communication Technologies. (ERIC Document Reproduction Service No. ED463469). Retrieved 8/26/07 from http://www.eric.ed.gov.

Walsh, W. B., & Holland, J. L. (1992). A theory of personality types and work environments. In W. B. Walsh, K. H. Craik, R. H. Price (Eds.), *Person-environment psychology: Models and perspective* (pp.35 – 69). Hillsdale, NJ: Lawrence Erlbaum Associates.

Walters, J. E., & Necessary, J. R. (1996). An attitudinal comparison toward computers between underclassmen and graduating seniors. *Education, 116*(4), 623-629.

Yan, H. (1997). CAD/CAM adoption in American textiles and apparel industries. *Dissertation Abstracts International, 58* (7), 3911. (UMI No. AAT 9802225).

Young, J. R. (2004). Testing service to unveil an assessment of computer and information literacy. *The Chronicle of Higher Education, 51*(12), A33.

Zis, S. L. (2002). Changing student characteristics: Implications for new student orientation. *The Journal of College Orientation and Transition, 10*(1), 64-68.

APPENDICES

APPENDIX A

SURVEY

Survey of Attitude and Aptitude Toward Social and Technical Technology

The current study was designed to find out more about college student attitude and aptitude toward social and technical computer and electronic technology and to use this information to better prepare students for academic and career success. Your participation is entirely voluntary and only group data will be reported. You maintain the right to withdraw from the study at any time. Should you have any questions, please contact Ms. Kathy Smith, (479) 575-2577 or Dr. Michael Miller (479) 575-3582, University of Arkansas. Thank you in advance for your participation.

PLEASE ANSWER ALL QUESTIONS USING THE SCANTRON PROVIDED.

Part I. Please answer the first two questions by marking the appropriate circles on the scantron.

1 Do you own a computer? Mark all that apply.

Personal Laptop	1
Personal Desktop	2
None	3

2 Which of the following electronic devices do you own? Mark all that apply.

Cell Phone	1
Smart Phone (cell/PDA combo, Blackberry,etc.)	2
iPhone (cell, PDA, Music, Video, Internet combo)	3
Electronic Music/video (iPod, MP3, etc.)	4
Electronic Game (Xbox, Playstation 2, 3, PSP, Nintendo DS, Wii, etc.)	5

Part II. Computer Skills. When using a computer, how would you rate your ability to perform the following tasks? (1=very low; 2=low; 3=average; 4=high; 5=very high)

	low				high
3 Entering and saving information (numbers or words) into a file	1	2	3	4	5
4 Opening a file	1	2	3	4	5
5 Using a storage device (thumbdrive, floppy disk, CD burning, etc.)	1	2	3	4	5
6 Escaping/exiting from a program or software	1	2	3	4	5
7 Copying an individual file	1	2	3	4	5
8 Using the computer to write a letter/essay	1	2	3	4	5
9 Using keyboard "hot keys"	1	2	3	4	5
10 Using a printer to make a "hardcopy" of your work	1	2	3	4	5
11 Deleting files	1	2	3	4	5
12 Opening software programs	1	2	3	4	5
13 Organizing/managing files and folders	1	2	3	4	5
14 Understanding terms/words relating to computer ***software***	1	2	3	4	5
15 Understanding terms/words relating to computer ***hardware***	1	2	3	4	5
16 Understanding the functions of computer hardware (keyboard, monitor, disk drives, CPU)	1	2	3	4	5
17 Troubleshooting computer problems	1	2	3	4	5
18 Installing computer software	1	2	3	4	5
19 Learning to use a variety of software programs (Excel, PowerPoint, etc.)	1	2	3	4	5
20 Doing statistical analysis on the computer using a statistical software package	1	2	3	4	5
21 Learning advanced skills within a specific software program	1	2	3	4	5
22 Asking for help with problems in the computer system	1	2	3	4	5
23 Using the help manual when help is needed	1	2	3	4	5
24 Accessing your university website	1	2	3	4	5
25 Using online library resources	1	2	3	4	5
26 Using wireless networking	1	2	3	4	5
27 Creating, reading, and sending e-mail	1	2	3	4	5
28 Creating, reading, and sending instant messages	1	2	3	4	5
29 Playing computer games online/offline	1	2	3	4	5
30 Downloading Web-based music/videos	1	2	3	4	5
31 Online shopping	1	2	3	4	5
32 Attaching documents to emails	1	2	3	4	5
33 Blogging	1	2	3	4	5
34 Accessing online social networks (Facebook, Myspace, etc.)	1	2	3	4	5
35 Listening/watching video pod-casts	1	2	3	4	5
36 Creating spreadsheets/charts (Excel, etc.)	1	2	3	4	5
37 Creating presentations (PowerPoint, etc.)	1	2	3	4	5
	low				high

38 Creating graphics (Photoshop, Illustrator, etc.)	1	2	3	4	5
39 Using video/audio software (Director, iMovie, etc.)	1	2	3	4	5
40 Creating Web pages (Dreamweaver, FrontPage, HTML,Java, etc.)	1	2	3	4	5
41 Accessing a course management system (WebCT, Blackboard, etc.)	1	2	3	4	5
42 Using Computer Aided Design software (AutoCad, etc.)	1	2	3	4	5
43 Using the Internet	1	2	3	4	5
44 Using search engines (Google, Yahoo)	1	2	3	4	5
45 Using online chat rooms	1	2	3	4	5
46 Using list serve mailing lists	1	2	3	4	5

Part III. Computer Attitude. Please rate yourself on the following questions. (1=disagree; 2=slightly disagree; 3=neither disagree or agree; 4=slightly agree; 5=agree)

	disagree				agree
47 Computers do not scare me at all	1	2	3	4	5
48 Working with a computer makes me very nervous	1	2	3	4	5
49 I do not feel threatened when others talk about computers	1	2	3	4	5
50 I feel aggressive and hostile toward computers	1	2	3	4	5
51 It wouldn't bother me at all to take a computer course	1	2	3	4	5
52 Computers make me feel uncomfortable	1	2	3	4	5
53 I would feel at ease in a computer class	1	2	3	4	5
54 I get a sinking feeling when I think of trying to use a computer	1	2	3	4	5
55 I would feel comfortable working with a computer	1	2	3	4	5
56 Computers make me feel uneasy and confused	1	2	3	4	5
57 I'm no good with computers	1	2	3	4	5
58 Generally, I would feel OK about trying a new problem on the computer	1	2	3	4	5
59 I don't think I would do advanced computer work	1	2	3	4	5
60 I am sure I could do work with computers	1	2	3	4	5
61 I'm not the type to do well with computers	1	2	3	4	5
62 I am sure I could learn a computer software program	1	2	3	4	5
63 I think using a computer would be very hard for me	1	2	3	4	5
64 I could get good grades in computer courses	1	2	3	4	5
65 I do not think I could handle a computer course	1	2	3	4	5
66 I have a lot of self-confidence when it comes to working with computers	1	2	3	4	5
67 I would like working with computers	1	2	3	4	5
68 The challenge of solving problems with computers does not appeal to me	1	2	3	4	5
69 I think working with computers would be enjoyable and stimulating	1	2	3	4	5
70 Figuring out computer problems does not appeal to me	1	2	3	4	5
71 When there is a problem with a computer that I can't solve, I stick with it until I have an answer	1	2	3	4	5
72 I don't understand how some people enjoy spending so much time working with computers	1	2	3	4	5
73 Once I start to work with the computer, I would find it hard to stop	1	2	3	4	5
74 I will use computers as little as possible	1	2	3	4	5
75 If a problem is unsolved in a computer case, I would continue to think about it afterward	1	2	3	4	5
76 I do not enjoy talking with others about computers	1	2	3	4	5

Part IV. Please rate yourself on your attitude toward other electronic devices such as cell phones, iPods, Blackberries, or electronic games.

	disagree				agree
77 Electronic devices do not scare me at all	1	2	3	4	5
78 Working with an electronic device makes me very nervous	1	2	3	4	5
79 I do not feel threatened when others talk about electronic devices	1	2	3	4	5
80 I feel aggressive and hostile toward electronic devices	1	2	3	4	5
81 Electronic devices make me feel uncomfortable	1	2	3	4	5
82 I get a sinking feeling when I think of trying to use an electronic device	1	2	3	4	5
83 I would feel comfortable operating an electronic device	1	2	3	4	5
84 Electronic devices make me feel uneasy and confused	1	2	3	4	5
85 I'm no good with electronic devices	1	2	3	4	5
86 Generally, I would feel OK about trying a new electronic device	1	2	3	4	5
87 I am sure I could operate most electronic devices	1	2	3	4	5
88 I'm not the type to do well with electronic devices	1	2	3	4	5
89 I think using an electronic device would be very hard for me	1	2	3	4	5
	disagree				agree

90 I have a lot of self-confidence when it comes to working with electronic devices	1	2	3	4	5
91 I would like working with electronic devices	1	2	3	4	5
92 I think using electronic devices would be enjoyable and stimulating	1	2	3	4	5
93 Figuring out problems with electronic devices does not appeal to me	1	2	3	4	5
94 When I have a problem with an electronic device, I stick with it until I have a solution	1	2	3	4	5
95 I don't understand how some people enjoy spending so much time using electronic devices	1	2	3	4	5
96 Once I start to use an electronic device, I would find it hard to stop	1	2	3	4	5
97 *I will use electronic devices as little as possible*	1	2	3	4	5
98 If I have a problem with an electronic device, I would continue to think about it afterward	1	2	3	4	5
99 I do not enjoy talking with others about electronic devices	1	2	3	4	5

Part V. Please tell me about yourself by marking the appropriate circles on the scantron.

100 What is your gender?
- Female 1
- Male 2

101 What is your ethnicity?
- African-American 1
- Asian 2
- Caucasian 3
- Hispanic 4
- Other 5

102 Are you a US Citizen?
- Yes 1
- No 2

103 What is your age?
- 18-19 1
- 20-21 2
- 22-25 3
- 26-40 4
- 41 or older 5

104 What is your class standing?
- Senior 1
- Junior 2
- Sophomore 3
- Freshman 4
- Other 5

105 What is your major?
- Apparel Studies 1
- Arts and Sciences 2
- Business 3
- Education 4
- Other 5

APPENDIX B

INSTITUTIONAL REVIEW BOARD APPROVAL FORM

TO: Kathleen R. Smith and Michael T. Miller, Ph.D.

FROM: WILLIAM C. BAILEY, PH.D. WCB
CHAIRMAN OF THE HESC HUMAN SUBJECTS COMMITTEE

SUBJECT: IRB APPLICATION FOR PROJECT ENTITLED: *A Comparison of the Aptitude and Attitude of College Student's toward Social and Technical Computer Technology*.

DATE: **October 16, 2007**

CC. RICHARD ROEDER, PH.D., ASSOCIATE DEAN FOR RESEARCH
MARY WARNOCK, PH.D., DIRECTOR SCHOOL OF HUMAN ENVIROMENTAL SCIENCES
ROSEMARY H. RUFF, DIRECTOR, RESEARCH SUPPORT AND SPONSORED PROGRAMS

A review of this proposal by doctoral student Kathleen R. Smith and Michael T. Miller, Ph.D. indicated that this research proposal is classified as "exempt." Ms. Smith's proposal was reviewed by the School of Human Environment's Human Subjects Committee because she is a 12-month Instructor within the School.

The proposed subjects are 2000 University of Arkansas students over the ages 18 and above. The research is a survey of aptitudes and attitudes toward computer skills. Data will be collected through a questionnaire and the answers written on a Scantron form. No names will be collected and participation in the research is totally voluntary.

The Committee forwarded your proposal to the University IRB committee with the recommendation of expedited status. This status may change at the University level. However, you can move forward with your plans to collect data. If there are any changes required by the University IRB, you will be informed.

This sounds like an important project. We wish you "good luck" in this accomplishing your research goals and completing your dissertation in a timely manner.

If there are any questions, please contact me at 575-2058 or by email at wbailey@uark.edu.